REPORT DOCUMENTATION PAGE

AD-A224 474

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	1990	Thesis/Dissertation

4. TITLE AND SUBTITLE
TIME-BASED COMPETITION FOR COMPETITIVE ADVANTAGE: AN INFORMATION TECHNOLOGY PERSPECTIVE

5. FUNDING NUMBERS

6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
AFIT Student at: University of Colorado

8. PERFORMING ORGANIZATION REPORT NUMBER
AFIT/CI/CIA - 90-041

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
AFIT/CI
Wright-Ptatterson AFB OH 45433

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release IAW AFR 190-1
Distribution Unlimited
ERNEST A. HAYGOOD, 1st Lt, USAF
Executive Officer, Civilian Institution Programs

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

14. SUBJECT TERMS	15. NUMBER OF PAGES
	178
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED			

TIME-BASED COMPETITION FOR COMPETITIVE ADVANTAGE: AN INFORMATION TECHNOLOGY PERSPECTIVE

by

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A thesis submitted to the

Faculty of the Graduate School of the

University of Colorado in partial fulfillment

of the requirements for the degree of

Master of Science

School of Business

1990

This thesis for the Master of Science degree by

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Time-based Competition for Competitive Advantage: An Information Technology Perspective

Thesis directed by Professor Carroll W. Frenzel

The environment which business faces today is much more competitive than in the past. Time-based competition is a new competitive strategy through which businesses may gain competitive advantage. Since this strategy is new, there is little information available to managers who are contemplating use of this strategy. Six case studies of time-based competitors are presented and discussed.

The research had three thrusts. The first was to place time-based competition in current works and models of competitive strategy. Time-based strategy was determined to be a strategic thrust. The time thrust was also found to be important enough to include within Carroll Frenzel's model of strategic influences, a model which builds upon strategic thrust theory.

The second thrust was to identify and validate which elements of time-based strategy are important and/or relevant to time-based competitors.

Eleven elements of time-based strategy were identified. Ten of these elements were validated by the time-based companies. The lack of the alter infrastructure element, the element not consistently used by the companies, did not affect the competitive advantages gained by use of the strategy.

The third thrust was to determine the importance of information technologies (IT) to time-based competition. This thrust also sought information of how time-based competitors support their time thrust by IT. Thirty-six IT applications and systems were identified throughout the organization which may be used in support of the time thrust. Time-based competitors stated that IT was critical to time-based strategy and that time-based strategy can not be executed without IT.

All six companies gained competitive advantage through their use of time-based strategy. The elements of time-based strategy and the IT applications identified in this research should provide managers practical and useful information which they can use if their companies decide to compete in time.

DEDICATION

I would like to dedicate this thesis to my wife Chris for her continuous support and encouragement in this endeavor. I also would like to dedicate this work to my parents for their infallible support through the years and also for instilling within me the joy of reading and the desire to learn.

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation and gratitude to Carroll Frenzel. The guidance I received in this research was very helpful and enlightening. I especially appreciate the insightful suggestions and the encouragement I received to make this thesis something I can be proud of when it is completed. Thanks to my committee members and other faculty whose comments, criticism, and wisdom helped me tremendously in my performance of this research.

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INTRODUCTION

Globalization of markets has resulted in a very competitive marketplace for firms. Firms jockey continuously for position within the marketplace. Each firm tries to gain advantage over their competitors. Industry boundaries blur in today's competitive arena, complicating the identification of competitors. Tremendous pressure is placed on managers to make their firms competitive. How should managers make their companies competitive? There is no right answer. Furthermore, the choice of management paradigms, competitive strategies, and fad management fixes available to managers today can be bewildering.

One new management paradigm, rapidly taking corporate America by storm, is called time-based competition.

> A recent survey of 50 major U.S. companies by Kaiser Associates, a Vienna, Virginia, consulting firm, found that practically all put time-based strategy, as the new approach is called, at the top of their priority lists.[1]

Why? Because time-based competitors have gained advantage over their peers.

Time-based competitors concentrate on how they manage time in all of their business activities. They eliminate or improve activities and processes which are time-wasteful. Consequently, time-based competitors are much more responsive to volatile market conditions than their competitors. They also have the ability to provide a more timely flow of products and/or services to their customers.

Research Questions

This research focuses on three distinct, yet, related areas of interest. These related areas of interest resulted in several research questions which formed the basis of this research.

The first question of this research was:

> How does time-based strategy fit into current management thought and works of competitive strategy?

Linking time-based strategy to existing models and theories in competitive strategy, will allow practicing managers to view time-based strategy in terms of accepted theory and thought. A major proposition of this research is that time-based strategy is a *strategic thrust*. Strategic

thrusts theory was developed by Charles Wiseman in his book Strategy and Computers: Information Systems as Competitive Weapons. Although time-based strategy satisfies the definitional requirements of a strategic thrust, Wiseman limits the number of strategic thrusts included in his model to five. Wiseman states that the five thrusts of cost, differentiation, innovation, growth, and alliance account for most of the major moves a firm may make to gain competitive advantage. This research seeks to confirm or reject this proposition by surveying managers in time-based companies for their opinions on whether or not time-based strategy should be considered as a strategic thrust. Managers will also be surveyed to see if the time thrust is comparable in stature to the five strategic thrusts already included in the model. If so, then there will be sufficient reason to include the time thrust in the model.

The second question of this research was:

> Which ingredients of time-based strategy are important and/or relevant to time-based competitors?

Although at first glance, this question may appear unnecessary-it is not. This strategy is new. Scarce literature on time-based competition limits

our knowledge of this subject. To complicate the problem further, there are several variations of this strategy mentioned in current literature. These variations differ in the number of ingredients required for time-based strategy. They also differ in which time-based ingredients are required. Furthermore, the literature mentions all of these ingredients without any sense of relative importance. Are all of these ingredients equally important? Or, are some ingredients more important than others? This research seeks to provide managers with some guidance as to which ingredients are important to time-based strategy.

The third aspect of this research distills down into two questions. The first question is:

> Does Information Technology (IT) play a vital role in support of time-based competitive strategy? And, if it does, How is IT used in support of time-based competitive strategy?

Using IT for competitive advantage is a critical issue today. The Index Group published a list of critical Management Information Systems issues for 1988. This study identified using information systems for competitive advantage as the fourth most critical issue facing senior IT managers and their superiors.[2] IT has played an important role in other competitive strategies such as cost,

differentiation, growth, innovation, and alliances. Strategic oriented competitors have parlayed IT into systems which have given them long-term competitive advantage. It doesn't seem unreasonable to expect IT to have similar successes with time-based strategy. This research aims to provide managers an IT perspective of time-based competition.

Review of current literature yields several examples of IT applications used by time-based competitors in support of their competitive strategy. However, there is no attempt by any of these works to address specifically how IT supports this strategy. Possibly IT is not important to time-based strategy. Or, this strategy is so new that no research has yet been undertaken to explore the relationships between IT and time-based strategy. This exploratory research seeks to provide managers a sense of how important IT is to time-based strategy and provide managers information on how IT may support this strategy.

Research Approach and Summary

This research used case studies. Six time-based competitors agreed to participate in interviews conducted in person or by telephone.

Chapter IV provides an in-depth description of the research methodology.

Case studies were divided into three sections plus a background discussion provided in the introduction. The time-based strategy section discusses the strategy in relation to strategic thrust theory and Frenzel's model. Frenzel's model integrates strategic thrusts with strategic targets and search bias. A macro level view of the company's use of time-based strategy is also provided, including the company's depth of involvement in the strategy, the companies reasons for use of this strategy, and a discussion of competitive advantage implications. The time-based initiatives section addresses specific elements of time-based strategy. This section describes each company's method of implementing time-based strategy. The third section discusses IT in relation to time-based strategy. IT's role and IT's impact on time-based competition is discussed.

Thesis Arrangement

Six chapters follow this introduction. Chapter II is a review of the important works of IT for competitive advantage. This chapter discusses

IT components and important models in competitive strategy. This chapter also provides the foundation for further discussion of time-based strategy relative to IT.

Chapter III is a review of time-based strategy. The elements of time-based strategy are examined. Time-based strategy is then discussed in relation to the models discussed in Chapter II.

The next chapter, Chapter IV, discusses the research methodology employed in this thesis. Selection of study participants, survey method, interview format, and the analytic strategy to be employed is discussed.

Chapter V presents the cases studies. A summary of the findings is also provided.

Chapter VI provides the discussion of the findings and what the findings mean in relation to the study's research questions.

Chapter VII is the thesis summary and conclusions. Suggestions for future research and suggestions for improving the thesis's research methodology are also included.

NOTES-CHAPTER I

1 Brian Dumaine, "How Managers Can Succeed Through Speed," Fortune, 13 February 1989: 54.

2 Carroll W. Frenzel, The Management of Information Technology, 1988, 13.

CHAPTER II

IT FOR COMPETITIVE ADVANTAGE

Using Information Technology (IT) for competitive advantage is a key issue for organizations as they seek advantage through their use of technology. This topic is the object of much research recently. Many models were developed to identify IT opportunities. Frenzel's model is the IT model central to my research. Other models, such as Porter's model of competition and Porter's value chain model, are extremely critical to any discussion of competition. I will examine these models in detail, for these models provide the critical link between time-based competition and IT used for competitive advantage. First, I'll discuss the components of IT.

IT Components

Information technology has two components. They are information processing and telecommunications. These components furnish IT its competitive advantage. Although both of these

components provide advantages singularly, it is the combination of the two which provides the greatest advantage. To understand what each component contributes to IT, I'll examine each component separately.

Information Processing

A good definition of information processing (IP) is given below.

> Information processing consists of those functions involved with the automated manipulation and distribution of information(data) used to carry out the operational processes of the enterprise and to support management decision-making.[1]

The heart of this IT component is the computer. Technological advances in computer componentry and design has yielded tremendous benefits, often strategic in significance. Computer circuitry and mass storage advances are most noteworthy, delivering "An unrelenting year-after-year 30-40 percent improvement in cost performance of circuitry and mass storage."[2] A fine illustration of those unrelenting advances is given by Eric Sumner, VP Operations Planning at AT&T Bell Laboratories. "I recall when random access memory chips that could store 128,000 bits of information cost the equivalent of a good apartment house--at

least $1 million. Today, the same memory costs less than a doorknob."[3]

The information processing component provides the means to store and manipulate information. This ability to process information has increased tremendously over the years as has the ability to store information.

Information processing has contributed to business for the past forty years. It's contribution to the organization, while mostly successful, has not been without its disappointments. Often, information processing has failed to live up to expectations. Perhaps a major reason for it's limited success, has been the motive for it's use. Many organizations don't view IP strategically. Some organizations look upon IP as a necessity to maintain the status quo and not as a means to gain competitive advantage. Recently, more organizations are awakening to the use of IP for competitive advantage. Publicized success stories of IP use which have led to competitive advantage and an increasingly competitive marketplace have organizations turning to IP for leverage.

Telecommunications

Telecommunications is comprised of voice, data, and imaging communications. All three are essential to business. Data communications, the younger element of telecommunications, is rapidly transforming business. Just what is data communications and what is its relation to IT? A good explanation is given by Hammer and Mangurian. "Data communications -- the facilities and technical procedures for electronic data transfer among remotely located computer equipment -- is the newest component of information technology."[4] This component of IT is very powerful. In fact, this component is the source of competitive advantage in many strategic information systems.

> "A recent review of strategic information systems conducted by (Information Week) catalogued the most widely known strategic uses of information systems. Working with a panel of experts, a list of the ten leading strategic systems was developed (see Appendix A). A close look at Appendix A suggests that telecommunications is the critical enabling technology for strategic use of information systems. All of the applications listed depend heavily upon telecommunications technology for their realization."[5]

How does telecommunications derive its competitive advantages? Telecommunications provides several important benefits. One is time

compression. A good explanation of time compression is given by Hammer and Mangurian.

> Through clear communications links, information can be transmitted quickly between sites or organizational units. Consequently, the time required to perform a larger business process, of which information transmission is a part, may be reduced.[6]

A second benefit of time compression is reduced information float. Information float is described in the following manner.

> Often because the user of some information in an organization is not the producer of that information, significant time may elapse between the production of the information and its communication to the user. Because of this 'float', the user may be employing inappropriate data. This occurs especially when data is of far less relevance to the producer than it is to the consumer.[7]

Telecommunications compresses communication time and therefore reduces information float. Consequently, managers are able to improve their decisions by basing them on timely data and information.

A third benefit which telecommunications provides, is the ability to overcome space or geographical barriers. Through the use of telecommunications, many widely distributed sites can act as one and provide economies of scale not possible with independent sites.

Peter Keen, supplies the fourth benefit of telecommunications. "Telecommunications eliminates the dichotomy between centralization and decentralization."[8] Telecommunications links between decentralized operating units and headquarters allow organizations to provide central quality control. Local suboptimization of goals is prevented, while still allowing decentralized units independent operation. Hammer and Mangurian provide a similar viewpoint.

> This simultaneous centralization and decentralization may represent the best of both worlds. Through the distribution of information and knowledge, decision making is widely dispersed and driven down to levels closest to operations, customers, and their associated problems. Conversely, information technology also allows senior executives to monitor the performance of their semi-independent decision makers. This enables them to identify problems at an early stage and to intervene where appropriate.[9]

The fifth feature of telecommunications is it can alter organizational relationships. This is a result of the communication patterns that are affected by telecommunications links. "Since relationships are, in effect, defined by lines of communication, a communications intensive information system can establish new relationships or dissolve old ones."[10] This feature can provide great benefits, if implemented and managed properly.

An excellent example of this feature is the recent trend of delayering of middle management. Telecommunications-based systems can expand management spans of control, as the need for middle management's communications intermediary role is eliminated. Direct communications between lower and upper levels are possible.

Models

The three models presented here are central to my research. Porter's Model of Competition is the most widely accepted model of competition. It very succinctly describes the forces present in competition. It is also the basis for most IT for competitive advantage models developed to seek out opportunities, including Frenzel's model. Many researchers[11,12,13,14,15,16] of competitive advantage have built upon Porter's research, linking his generic strategies and forces of competition to IT use. The third model, Porter's value chain, is useful for performing intraorganizational analysis and for providing a standardized means of viewing business activities. Much less research has been performed relating the value chain to IT use, suggesting that there may be some benefits to be

realized in this area. Authors[17,18] have researched this area and one author[19] has researched the use of telecommunications for competitive advantage as it relates to the value chain.

Porter's Model

Michael Porter describes five competitive forces which define the industry structure and a firm's competitive environment. The five forces are as follows: 1) bargaining power of buyers, 2) bargaining power of suppliers, 3) threat of new entrants, 4) threat of substitute products, and 5) rivalry among existing competitors. The relative magnitude of these forces vary by firm and by industry. For a in depth explanation of these five forces, refer to Porter's Competitive Strategy: Techniques for Analyzing Industries and Competitors. These forces and their determinants are shown pictorially in Figure 2.1.

Porter gives three generic strategies which organizations may use to cope successfully with these forces. According to Porter, these strategies provide the means to outperform other firms in the industry. Charles Wiseman summarizes Porter's view of competitive strategy below.

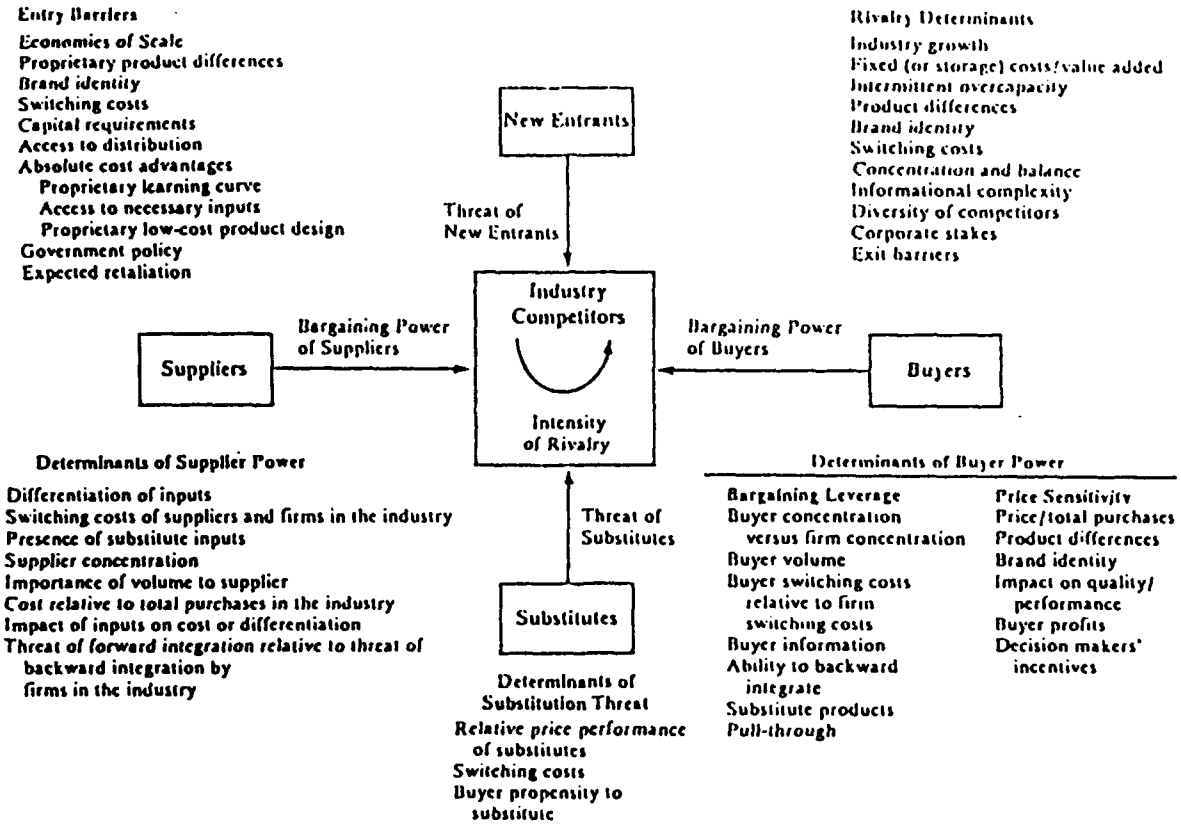

Figure 2.1 Porter's Model of Competition and Determinants.
Source: Michael E. Porter, Competitive Strategy: Techniques for Analyzing Industries and Competitors (New York: Free Press, 1980), 35.

> For Porter, competitive strategy involves `taking offensive or defendable actions to create a defendable position in an industry, to cope successfully with the five competitive forces....and thereby yield a superior return on investment for the firm.'[20]

Firms attempt to harness these forces so that they may gain advantage over their competitors. The three generic strategies that Porter gives us are overall cost leadership, differentiation, and focus. Overall cost leadership requires an organization to pursue

> aggressive construction of efficient scale facilities, vigorous pursuit of cost reductions from experience, tight cost and overhead control, avoiding marginal customer accounts, and cost minimization in areas like R&D, service, sales force, advertising, and so on....Low cost relative to competitors becomes a theme running through the entire strategy.[21]

Porter's second generic strategy "is one of differentiating the product or service offering of the firm, creating something that is perceived industrywide as being unique."[22] The third generic strategy which Porter offers is focus. Focus targets a particular industry segment.

> The strategy rests on the premise that a firm is thus able to serve its narrow strategic target more effectively or efficiently than competitors who are competing more broadly. As a result, the firm achieves either differentiation from better meeting the needs of the particular target, or lower costs in serving this target, or both."[23]

This model has gained wide acceptance. What's more, research has substantiated this model. "This model has been supported by a wide range of empirical studies that have documented the importance of these factors to profitability (Caves and Porter, 1977; Harrigan, 1980, 1982, 1895; Yip, 1982)."[24]

One criticism of Porter's model, is that it is static in nature, whereas competition itself is very dynamic. Ken Smith, researcher at University of Maryland, asserts that "past tests of the model have been static in nature and have ignored the dynamic nature of competitive interaction"[25] and "the extent to which Porter's forces affect profitability must be considered in the context of competitive interaction."[26] There remains many questions of the relationship between time and competition. Additional research in this area should prove fruitful as global competition compels organizations to focus on competition dynamics.

Frenzel's Model

Frenzel's model is graphical means of portraying interrelationships of strategic thrusts, targets, and search bias. Discussion of these variables will spell out the usefulness and

completeness of this model. This model is based upon sound theory and accepted works in competitive strategy. This model aides organizations in the search for strategic opportunities. See Figure 2.2 for Frenzel's Model.

Charles Wiseman, in his book Strategy and Computers: Information Systems as Competitive Weapons, explains his theory of strategic thrusts and targets. Wiseman contends that the five strategic thrusts of differentiation, cost, innovation, growth, and alliance are adequate to account for most major moves an organization may make in search for advantage. These five thrusts are derived from two separate works of competitive strategy. They are Alfred Chandler's *Strategy and Structure: Chapters in the History of American Enterprise* (1962) and Michael Porter's *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (1980). Chandler's work centers on the relationship between an enterprises growth strategy and the organizational form adopted to execute that strategy. As decisions on growth and organizational form are strategic in nature, Wiseman derives his thrusts of growth and alliance from Chandler. Wiseman also derives the innovation thrust from

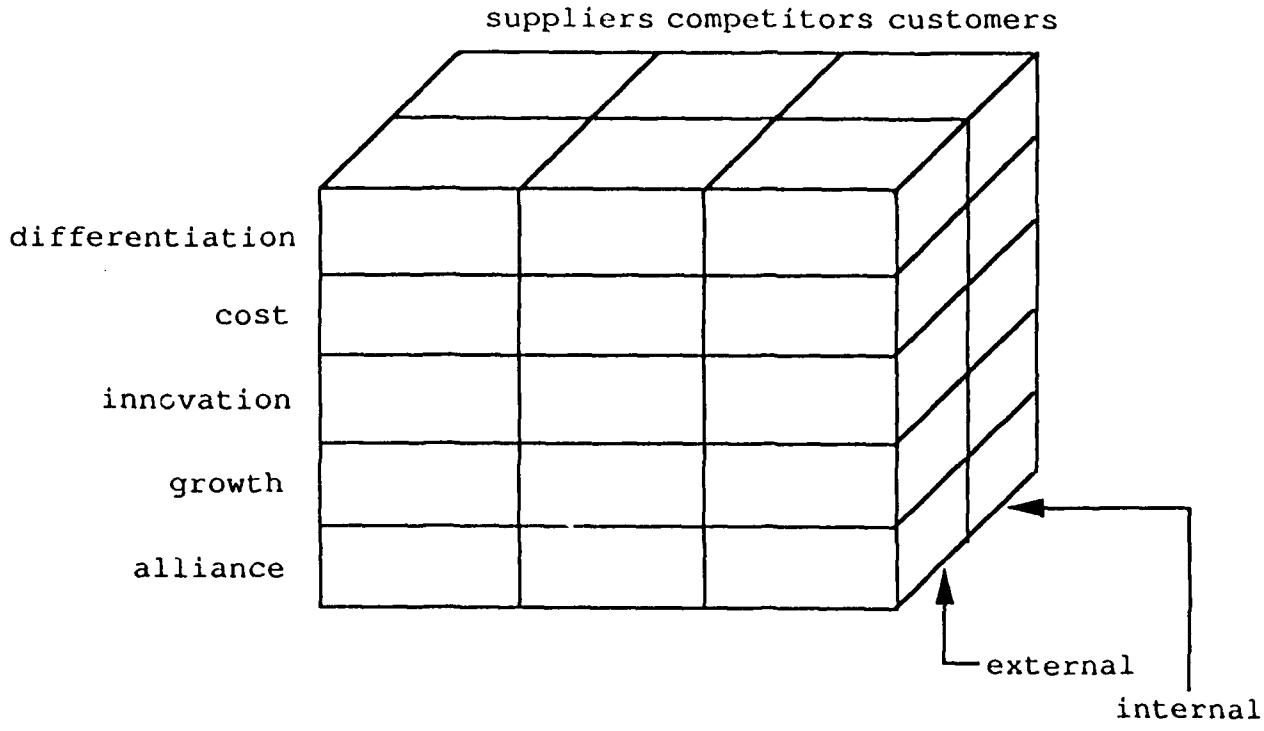

Figure 2.2 Frenzel's Model: The Integration of Strategic Influences.
Source: Carroll W. Frenzel, The Management of Information Technology, (Boulder: N.P. 1988), 54.

Chandler's work. Wiseman derives the thrusts of cost and differentiation from Porter's work.

What is a strategic thrust? Wiseman states that a strategic thrust has four properties. The first property is "they manifest *strategic polarities*. By this I mean that they are capable of assuming opposing sets of attributes, depending upon their strategic use."[27] For example, a thrust may be used offensively to gain competitive advantage or it may be used defensively to lesson the advantage of rivals. The second property a thrust exhibits is "members of this generic set of strategic moves frequently occur in combination."[28] This property realistically portrays the multiplicity of real world strategies. A firm often has several major goals, not just one. The third property a thrust exhibits is

> members of this set are subject to a variety of ordering or degree relations. For example, a cost reduction may be major, medium, or minor and a differentiation, innovation, alliance, or growth move may be short-term or long-term.[29]

The fourth property a thrust contains is illustrated below.

> members of this set are often related by dialectical processes such as the one illustrated above by Durant's jump from carriages into automobiles....Durant-Dort had evolved into the leading carriage and wagon producer in the United States. To be in that

> position, it had either a cost or differentiation advantage. Yet, Durant knew that this edge would be worthless if the automobile replaced the carriage as the primary mode of house-hold transportation. In term's of strategic options, therefore, innovation, growth via diversification, or alliance were open to him as possible moves to transform the nature of Durant-Dort's activities so that it could survive in the new automotive environment. But innovation in the carriage industry wouldn't be worth the effort, assuming Durant's hypothesis. Therefore, he had only two options, and to build his new enterprise he pursued both: growth via diversification (making use of resources drawn from Durant-Dort) and alliance formation. When Durant's empire-building activities came to a close and Sloan was left to rationalize GM's uncoordinated holdings, the dialectical process culminated (temporarily at least) as the focal points of competitive advantage switched from growth and alliance to cost, differentiation, and innovation maneuvers; when these were exhausted, the dialectic resumed again with the pursuit of growth or alliance opportunities.[30]

The distinction between cost and differentiation thrusts and cost and differentiation generic strategies must be made because there is a chance of confusion. Wiseman is careful to distinguish their differences as well as their similarities. Wiseman asserts that strategic thrusts can be used to support or shape Porter's three generic strategies. Thus, thrusts in a number of different combinations, degrees, and reasons, may be used in support of the overall generic strategy. The principle difference between Porter's strategies and Wiseman's thrusts is that conceptually, Porter's strategies are not polar in nature, whereas

strategic thrusts do not suffer from this limitation. An in-depth discussion of the similarities and differences between Porter's generic strategies and Wiseman's strategic thrusts may be found in *Strategy and Computers: Information Systems as Competitive Weapons* (1985).

The second variable of Frenzel's model is strategic targets. This variable is also defined by Wiseman. Wiseman gives us three strategic targets of strategic thrusts: suppliers, customers, and competitors. Strategic thrusts may be aimed at any of these targets to gain advantage over that particular target.

Search bias is the third variable. Frenzel identifies two means of searching out opportunities for strategic systems. First, the enterprise can look internally for opportunities. Many strategic systems have started their life in this manner. As companies seek to improve internal processes, they sometimes develop systems of great strategic value. A good source of potential strategic opportunities exist in the firm's portfolio of application systems. Firms can question their applications with a strategic orientation. Frenzel states that, "These and other questions directed at our current

applications form the basis on which to search for strategic opportunities internally."[31]

The second search bias is to search for opportunities by examining external factors.

> These factors include the changing industry environment, recent competitive actions, changing relations among suppliers, and potential business combinations, along with possibly many others. This view of the firm asks the question: What is happening external to the firm that may influence our opportunities to gain competitive advantage? How can we capitalize on external factors through the use of information technology?[32]

Externally focused personnel are usually found in the top positions of the firm. Therefore, a cooperative effort between those individuals and IT personnel is required to capitalize on externally biased strategic thrusts.

Value Chain

Michael Porter explains the concept of the value chain as

> This concept divides a company's activities into the technologically and economically distinct activities it performs to do business. We call these `value activities'. The value a company creates is measured by the amount that buyers are willing to pay for a product or service. A business is profitable if the value it creates exceeds the cost of performing the value activities. To gain competitive advantage over its rivals, a company must either perform these activities at a lower cost or perform them in a way that leads to differentiation and a premium price (more value).[33]

The value chain is shown in figure 2.3. Figure 2.3 defines nine value activities. These nine activities are divided into two different categories. The first category is primary activities. Inbound logistics, Operations, Outbound logistics, Marketing and Sales, and Service activities make up the first category. The second category includes the support activities of Firm infrastructure, Human resources management, Technology development, and Procurement. The support activities "provide the inputs and infrastructure that allow the primary activities to take place."[34] Table 2.1 provides descriptions of the value activities. Linkages is a particularly significant concept associated with the value chain.

> A company's value chain is a system of interdependent activities, which are connected by linkages. Linkages exist when the way in which one activity is performed affects the cost or effectiveness of other activities. Linkages often create trade-offs in performing different activities that should be optimized. This optimization may require trade-offs. For example, a more costly product design and more expensive raw materials can reduce after-sale service costs. A company must resolve such trade-offs, in accordance with its strategy, to achieve competitive advantage.[35]

Coordination between activities is extremely important in linkages. Porter and Millar explain,

> Linkages also require activities to be coordinated. On-time delivery requires that

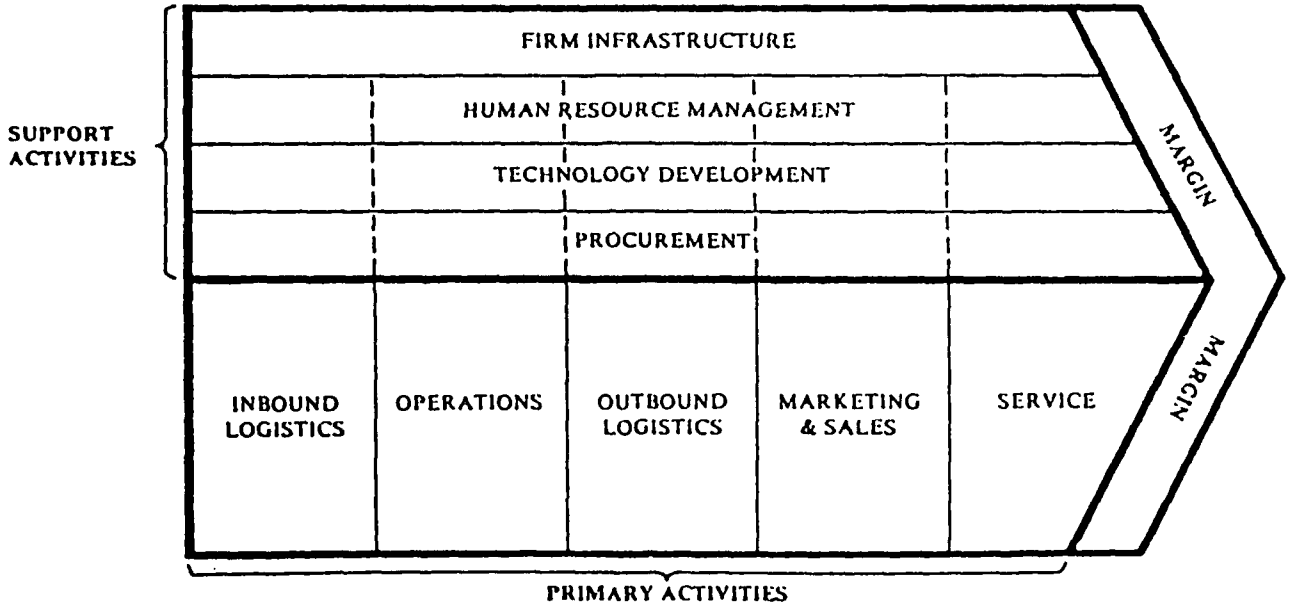

Figure 2.3. Value Chain.
Source: Michael E. Porter, Competitive Advantage: Creating and Sustaining Superior Performance (New York: The Free Press, 1985), 37.

Table 2.1

Descriptions of Value Chain Activities

Value Activity	Description
Inbound Logistics	Activities related to receiving, storing, and disseminating inputs to the product.
Operations	Activities related to transforming inputs into final product form.
Outbound Logistics	Activities related to collecting, storing, and distributing the product to buyers.
Marketing and Sales	Activities relating to providing means for buyers to purchasing products and influencing them to do so.
Service	Activities to provide service or to enhance or maintain the value of the product.
Procurement	The function of purchasing inputs used in the value chain.
Technology Development	Range of activities to improve the product or process.
Human Resource Management	Activities related to recruiting, hiring, training, development, and compensation of personnel.
Firm Infrastructure	Activities consisting of management, planning, finance, accounting, legal, government affairs, and quality control.

Source: Abstracted from Michael E. Porter, Competitive Advantage: Creating and sustaining Superior Performance (New York: The Free Press, 1985), 39-43.

> operations, outbound logistics, and service activities (installation, for example) should function smoothly together. Good coordination allows on-time delivery without the need for costly inventory. Careful management of linkages is often a powerful source of competitive advantage because of the difficulty rivals have in perceiving them and in resolving trade-offs across organizational lines.[36]

The value chain's most useful feature is that it provides a logical means of subdividing the internal activities of an organization. Even though organizations may differ, most organizations do perform all of the value activities. This standardized means of portraying activities allows us to discuss issues and variables in a meaningful context, because their is a common reference.

Summary

As organizations strive to leverage their investments in IT to gain competitive advantage, it is essential to understand competition, competitive strategy, and fundamental business activities. Porter's model of competition provides a widely accepted model of competitive interaction. Frenzel's model of integrated strategic influences provides an effective model for detailing strategic thrusts, strategic targets, and search biases. This model is an effective tool for searching out strategic opportunities. Porter's value chain model

provides an effective means of understanding and portraying business activities from an intraorganizational perspective.

NOTES-CHAPTER II

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4 Riehl, 16.

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CHAPTER III

TIME-BASED COMPETITION

Time-based competition and it's synonyms of speed and fast-cycle capability, is a management paradigm as well as a general strategy which organizations use to achieve competitive advantage. Although time-based competition is not a new operating concept[1], it is a concept which is receiving much attention recently. Today's competitive environment places organizations under great pressures to perform efficiently and effectively. Time-based competition provides an effective operating strategy which can lead to competitive advantage.

What is time-based competition? There are as many definitions as there are synonyms. A good simple definition of time-based competition is given by George Stalk, Jr. in his article "Time--The Next Source of Competitive Advantage". He defines time-based competition as "The ways leading companies manage time-in production, in new product development and introduction, in sales and

distribution." He also asserts that this strategy "represents the most powerful new sources of competitive advantage."

Why should companies use this strategy and not the usual strategies of cost and differentiation? The reason is focusing on managing time, rather than costs or other variables, can provide many organizational capabilities and benefits.

> Today, executives in more and more large, complex businesses are achieving sustained competitive advantage by making radical changes in how they manage time within their companies. These companies make decisions faster, develop new products earlier, and convert customer orders into deliveries sooner than their competitors. As a result, they provide unique value in the markets they service, value that can translate into faster growth and higher profits.[2]

Organizations which compete with this strategy are better able to compete in today's dynamic environment. Time-based strategy provides the means for organizations to provide unique value in their competitive arena.

Elements of Time-Based Competition

The various types of time-based strategy paints a puzzling picture. Elements of strategy differ, as does the number of elements required by

each variation. I have distilled eleven elements of time-based strategy which I think are essential to the strategy. This integration of elements across different time-based strategies, should provide an integrated view and understanding of time-based competitive strategy.

Redesign Business Processes

Using a time-based strategy is decidedly different from typical strategies. Management, organizational thinking and practice are all based on traditional strategies of cost or differentiation. Business processes designed to function under different strategies don't work well under a time-based strategy. Therefore, it is considered foolish to speed up existing processes. Gains made by speeding up existing processes and practices will be marginal and will not lead to a sustainable competitive advantage. Time must be spent performing planning and analysis prior to changing processes. Time spent in "front end" analysis will provide significant time reductions. Front end analysis is not always performed as sometimes there is pressure to make progress in the short term. " `The gut reaction,' says Steven Wheelwright, a professor at the Harvard Business

School, `is, let's cut six months out. It's not, let's do the analysis and rethinking that will allow us to cut six month's out.'"[3] This is a problem that organizations must face when applying a time-based strategy. Most organizations, after thinking about piece-meal changes, do conclude that they must change their processes. Northern Telecom, Inc. is undergoing the transformation to a time-based strategy. Roy Merrills, president of Northern Telecom, explains their decision to change their processes instead of speeding up existing processes.

> We had adopted the JIT production philosophy at some of our plants, and we considered applying other management fixes that were popular at that time-advances like computer-integrated manufacturing, fast-flow manufacturing, automation, and cross-training. But while adopting these techniques piecemeal would help us fine-tune the existing processes, we concluded that this path would give us only a short-term advantage over competitors. The other path was to completely rethink our manufacturing process. This path was more difficult, but the more we thought about it, the more convinced we became that it was the right response to global competition, rapid technological change, and even shorter product lives.[4]

Look at All Functions

Using a time-based strategy as an overall strategy means that you must address all facets of the business in order to gain full advantage. For example, using time-based strategy in operations

without using time-based strategy in outbound logistics causes some of the benefits gained in operations to be wasted. Of course some functions and segments of the business are more important than others, depending upon business type and industry type. Significant functional areas should receive the most attention. These areas should also be given attention first, as they will benefit the most. However, in order to garner the most benefit and to receive sustainable competitive advantage, all aspects of the business should be addressed. A good example is given by Toyota Motors. In the 1970's, Toyota was two separate companies. Toyota Motor Manufacturing produced the cars and Toyota Motor Sales distributed and marketed the cars. The problem was

> Toyota Motor Manufacturing could manufacture a car in less than two days. But Toyota Motor Sales needed from 15 to 26 days to close the sale, transmit the order to the factory, get the order scheduled, and deliver the car to the customer. By the late 1970's, the cost-conscious, competition-minded engineers at Toyota Manufacturing were angry at their counterpoints at Toyota Motor Sales, who were frittering away the advantage gained in the production process. The sales and distribution function was generating 20% to 30% of a car's cost to the customer-more than it cost Toyota to manufacture the car!5

The two companies merged and management of the Toyota Motor Sales was changed. The results of

this new management and the changes that were made to their company, illustrate how they addressed the problems.

> The company wasted no time in implementing a plan to cut delays in sales and distribution, reduce costs, and improve customer service. The old system, Toyota found, had handled customer orders in batches. Orders and other crucial information would accumulate at one step of the sales and distribution process before dispatch to the next level, which wasted time and generated extra costs. To speed the flow of information, Toyota had to reduce the size of the information batches. The solution came from a company-developed computer system that tied its salespeople directly to the factory scheduling operation. This link bypassed several layers of the sales and distribution function and enabled the modified system to operate with very small batches of orders. Toyota expected this new approach to cut sales and distribution cycle time in half-from four to six weeks to just two to three weeks across Japan. But by 1987, Toyota had reduced system responsiveness to eight days, including the time required to make the car....The results were predictable: shorter sales forecasts, lower costs, happier customers.[6]

This example illustrates why the entire value chain must be addressed when using a time-based strategy in order to achieve maximum advantage. The method used by Toyota of bypassing several layers of management to schedule an order by use of a computer system, shows us the next important ingredient of time-based strategy.

Wipe Out Approvals

Unnecessary approvals slows a process down tremendously. Typical hierarchical organizational structures are not suited for time-based competition. Consultants recommend that companies look hard at the number of times a product or service requires approval before it reaches a customer.

> Philip Thomas, president of Thomas Group, a Dallas consulting firm specializing in speed, says that manufacturing typically takes only 5% to 10% of the total time between an order and getting a product to market; the rest is administrative.[7]

A good example of the delays caused by approvals is the case of Honeywell's Building-Controls division. They brought in consultants to redesign their operating systems.

> One of the first things they looked at was a 3-inch-thick manual, nicknamed the "green book," that described in minute detail how projects were to be conducted. It listed how approvals should be obtained before the project could advance to the next step. On average, each project required 38 approvals....Today, the green book is 20 pages, double-spaced, and the average project-development time has been shaved from four years to 14 months.[8]

Of course you can't just eliminate layers without changing the power structure of the organization. Responsibility and authority must be pushed down to worker level so that decisions can be made without delay. A good example of this

practice, is the consolidation of operations and changes in business practices of General Electric's circuit breaker business in Salisbury, North Carolina. General Electric needed to eliminate delays in decision making on the factory floor.

> The solution was to get rid of all line supervisors and quality inspectors, reducing the organizational layers between worker and plant manager from three to one. Everything those middle managers used to handle-vacation scheduling, quality, work rules- became the responsibility of the 129 workers on the floor, who are divided into teams of 15 to 20. And what do you know: The more responsibility GE gave the workers, the faster problems got solved and decisions made.[9]

These examples point out another facet of time-based strategy. Work is often conducted in teams. This is the next element of time-based strategy.

Teams

Multi-departmental teams are an essential part of time-based strategy. These teams are usually kept small to eliminate communication problems common in larger groups. A good description of departmental teams is given by Joseph Bower.

> The teams must be self-managing and empowered to act because referring decisions back up the line wastes time and often leads to poorer decisions. The teams must be multifunctional because that's the best-if not

> the only-way to keep the actual product and its essential delivery system clearly visible and foremost in everyone's mind.[10]

These teams are designed for everyday work and not just for special projects. Skunkworks, teams which are designed to operate outside the organizational bureaucracy, are not desirable. The goal is to institutionalize organizational policies, structure, and practices which contribute to time-based strategy.

> Skunk works that bypass the organization's regular review mechanisms won't develop fast-cycle capability or help managers root out quality and time problems in their operation. Fast-cycle managers know that routine work determines a company's effectiveness, not special projects. So rather than circumvent a slow-moving core by creating outlying units that are smaller, quicker, and more responsive, these executives work to build these qualities into the company as a whole-even if it means taking themselves out of some critical decision loops.[11]

A fine example of institutionalizing teams is found at AT&T. John Hanley, Vice President of product development at AT&T, decided to make teams work within the bounds of AT&T. He considered skunkworks but rejected that idea, "figuring that if his people couldn't develop a new product within AT&T they wouldn't achieve a significant and permanent change."[12] Hanley formed teams within AT&T which provided a lasting change in the way

development work was performed. These changes gave AT&T significant time savings.

Stick to Schedules

Strict adherence to time schedules is a must in an organization using a time-based strategy. Clear deadlines must be set and discipline must be used. "Time-based competitors avoid the seemingly inevitable delays of organizational life by creating calendars for important events and insisting that *everyone* meet their commitments, so review and decision activities stay on track."[13] Time-based competitors realize the importance of this element of the strategy. In fact, "Honda worships the schedule. In this corporate culture, it's a crime to be late."[14]

Track Times

A prerequisite to worshiping the schedule, is that times must be tracked. This is common sense. But it is very important. Time-based competition doesn't work if you track costs instead of times. Information systems can provide assistance in this endeavor.

Raise Standards

Standards must be raised in time-based companies. Incremental changes in performance standards of several percent will not achieve the competitive advantage desired. Standards should be raised to a level which will significantly change the magnitude of performance. Push for performance standards much tougher than your toughest competitors. Response times and cycle time standards are the most important. Other standards, such as cost and quality, cannot be ignored.

Better Communications

Information flows and decision-making must be rapid as to not impede business processes. An effective and timely information system, whether it is automated or not, is vital to this type strategy. The overall goal is to have the correct information available where and when it is needed. The goal of better communications is the motivating reason for the use of teams and the delayering of hierarchical organization structures. Small Multi-functional teams have better inter-personal communications. Decreased layers in the hierarchy permits a more rapid and correct exchange of information, as

intermediaries do not impede information flow or alter the information in any way.

Honda Motor Co. illustrates the emphasis it places on the importance of communications in it's strategy of time-based competition in several ways. First,

> It keeps all the elements for the manufacture of a car under one roof. Other carmakers may segment the process by, for instance, having a stamping plant separate from the assembly plant. `This means that communication is more difficult and time is lost,' says Roger Lambert, Honda's manager of corporate communications.[15]

Secondly, Honda's department managers do not have private offices. All managers share a large room adjacent to the factory floor. Roger Lambert says that it serves the same functional advantage of a newsroom. "We don't have to make an appointment to see somebody next Tuesday. We can just go talk to each other. It encourages getting things taken care of right away."[16]

Put Speed in the Culture

Company culture is important. Time-based competition is foreign to most organizations. Time-based competition relies upon quick decision making, flexibility, and close working relationships between competition-minded people of different functional

areas. Companies that build these qualities into their culture have an advantage over their competitors. Domino's Pizza, America's second largest pizza chain, built it's business on speed. Tom Monaghan, CEO of Domino's Pizza, says "Our whole business is built upon speed."[17] Some of the ways in which Domino's imparts speed into their culture is by having their employees view films of the fastest pizza makers and the fastest pizza deliverers. Competition between regional divisions for sales, best pizza, and fastest deliveries all seek to put speed into their culture.

Honda Motor Co. is another company which actively seeks to put speed into their culture. Honda's method is unique in that they circulate engineers through their Formula One racing team. Although Honda is a relatively new competitor in this race circuit, they have won the circuit 3 of the 6 years they have competed. The reason they compete in the circuit is because their people

> learn the importance of being on time and of quick responses. `If you find a problem on Saturday, you have to solve that problem before Sunday's race,' says Lambert. Engineers also develop the will to win during those rotating stints with the racing team.[18]

These engineers then go back into mainstream Honda to spread this spirit into the rest of the company.

Alter Infrastructure

An organization's infrastructure must be altered to support time-based competition or it will impede progress. Policies and practices relating to capital budgeting, personnel, and internal financial reporting methods must all be altered to insure support of the new strategy. Northern Telecom's president, Roy Merrills, in his transformation of Northern Telecom to a time-based competitor, points out the importance of addressing these issues. "We knew that regardless of the inherent value of the core programs (programs they introduced to increase time advantages), they wouldn't succeed unless the organizational infrastructure supported them."[19]

Northern Telecom changed their cost accounting system. The finance people realized that the managers didn't have the numbers they needed in a time-based environment. The accountants introduced "a profit-and-loss statement for internal use. The P&L replaced absorption accounting with an expense-based system that more accurately reflects the real cost drivers."[20]

Capital budgeting should also be altered to support time-based strategy. Northern Telecom altered their capital budgeting justification criteria in just this manner. Financial payback periods was once the only criteria used for capital investment. However, now managers "can justify projects by pointing to quality improvements and time savings."[21]

Incentive policies should also support time-based strategy. People do what gets rewarded. Therefore, incentive programs and policies should be modified to reward people that make improvements to or support time-based strategy. Northern Telecom adjusted their incentive programs to "encourage behavior that fit with our need to respond to customers fast."[22]

This is not a complete list of variables which should be addressed when modifying the infrastructure to complement time-based strategy. It does illustrate that every element of corporate policy and practice should be examined for potential alteration, so that company infrastructure may effectively support time-based strategy.

Education and Training

Education and training are the most important elements when it comes time to implement time-based strategy. Time-based strategy is foreign to many organizations. Consequently, implementation of time-based strategy can be quite traumatic. People naturally resist change because the familiar is very comfortable and the unknown can be very threatening. Therefore, when an organization chooses to use a time-based strategy which impacts and changes virtually every aspect of the business, education and training is imperative. People need training to function in an new environment. More importantly, people need to understand why they are doing something. Northern Telecom and Honeywell Corporation, through their transformation into time-based competitors, offers some important lessons about education and training of their people, for they initially encountered resistance and anxiety from their personnel.

Northern Telecom was performing reasonably well when they decided to change to a time-based strategy. They changed from a cost strategy to a time-based strategy because competition was mounting. Northern Telecom was also concerned about their ability to compete successfully in the long

term. Northern Telecom, realizing that changes to their company would be pervasive and that resistance would be encountered, sought to educate their people about the new strategy. Roy Merrills, president of Northern Telecom, explains

> Business had been booming, so there was no obvious need to change. Notions that threatened functional and divisional allegiances and pride naturally encountered resistance. To minimize that resistance, we turned our attention to the systems that reinforce the new time-based strategy....We turned first to the group we depended on most for the program's success, our middle managers. In groups of 25, they attended week-long education sessions at our corporate training and development center to learn the philosophy behind the strategy and the fundamentals of time-based operations....About 300 middle managers went through the program the first year. Next we introduced a two-day course tailored to the first-level managers and professionals. A total of 1,000 people have attended these courses since the start. We hope to reach all 8,000 middle managers, supervisors, and professionals eventually.[23]

Northern Telecom also provided training for their people in teamwork. They simulated working as teams to bring a new product to market. This simulation provided valuable teamwork training for their people. Northern Telecom's education and training efforts played a vital role in their successful migration to a time-based strategy.

Honeywell Corporation, in their transition to a time-based strategy, also focused on education and training of their people. Some of the steps

taken by Honeywell to alleviate anxiety are explained below.

> When the changes were first announced, employees were apprehensive. Honeywell tried to address the fears and prepare the work force for the new system by offering some courses in risk-taking and empowerment. It also made sure there were quite a few one-on-one discussions assuring employees that management was quite serious about speeding up the process and that it could be done without straining the workers; that is , this was not to be a speed-up in the sense of `work harder and faster until you burn out or drop dead'....Managers and supervisors needed special attention. They needed to eschew management by control and learn how to be coaches to these somewhat self-managing teams.[24]

These illustrations show how vitally important it is to address the issues of education and training when implementing a time-based strategy.

This brief treatise of time-based strategy elements will now allow us to examine this strategy in relation to competition and IT for competitive advantage.

Time and IT Components

There is much compatibility between IT and time-based competition. Information processing can aid in the storage, processing, and retrieval of information required to support the time-based strategy. Telecommunications provides many

advantages compatible with time-based strategy. Time compression, reduced information float, the ability to eliminate space barriers, and the ability of telecommunications to eliminate the dichotomy between centralized control and decentralized operations provides a unique match between the underlying competitive attributes of telecommunications-based information systems and the goals of time-based competition.

Although authors of works in time-based competition mention in passing the use of IT in support of their strategy, such as CIM, CAD/CAM, flexible manufacturing systems, and telecommunications links between far-flung operations, no one has looked at just how important IT is to this strategy and how IT supports this strategy. How much value does time-based strategy add to the different parts of the business and how much of that value is due in part to IT? These questions are the central to my research because time-based strategy is important in today's environment. In addition, IT is vital to organizations today. However, IT must support strategic goals if it is to have great impact. This fact holds true for time-based competitive strategy

as well. Gregory Parsons states in his article on Information Technology: A New Competitive Weapon, that

> Clearly, a firm should use IT to support, reinforce, or enlarge its business strategy....Although a firm may benefit from an IT application that is not consistent with its competitive strategy, it will enjoy much greater strategic benefits from an IT application that is consistent with and supportive of its competitive strategy.[25]

Time and Competition

Although we can intuitively understand why time-based competition provides a source of competitive advantage, it is not so easy to relate it to theory of competition and current models. Two author's of works in competitive strategy do attempt to address this shortcoming. Their insights should help ground firmly this competitive strategy into current theory and model's of competition.

Ken Smith, researcher at the University of Maryland, focuses in on one of the shortcomings of Porter's model of competition. He asserts that Porter's model is static, whereas, competition is dynamic. Smith proposes a theory of competitive response time in order to "concentrate more directly on the dynamic elements of strategy and competition."[26] Although this is a preliminary

theory relating organizational performance to response time and response time to a number of organizational and environmental factors, it does demonstrate the importance of response time. Smith focuses in on response time because,

> "Researchers can obtain a more complete picture of competitive interaction by focusing their attention on response time. Response time is an observable, objective measure that captures the dynamics of strategy and competition and enriches the understanding of competitive behavior."[27]

Before we look at this theory, it is necessary to define response time. Response time is the "speed with which a competitor responds to another firm's strategic action."[28] Smith hypothesizes that the environmental factor of environmental instability and the organizational factors of formalization, internal and external orientation, degree of threat, and degree of radicality all affect and influence response time, which in turn affects organizational performance. Although Smith proposes and tests hypothesizes regarding each one of these factors in relation to response time and organizational performance, it is more important for this discussion to understand the basic over-riding hypothesis. Smith asserts that, "a longer response time will be more profitable for

the firm that initiates the action and less profitable for the slow-responding firm."[29] Smith tests this hypothesis and the individual hypothesizes regarding the different factors by performing a field study using questionnaires and interviews of 22 top-level managers in high-technology firms. The results of the study were supportive of the theory.

> "As response time decreases, sales growth increases. Response time is also related to a firm's strategic orientation, perceptions of competitors actions by managers, and environmental instability. A firm's overall orientation was also found to be related to profitably."[30]

The results of this study help to put the significance of responsiveness, a vital ingredient of time-based strategy, in context with the works of competition and strategy. There are two items which we should elaborate upon before preceding to the next corroborative work on response times.

Smith's factor of environmental instability is significant and very enlightening. It is not just chance that there is a recent upsurge in interest in responsiveness and time-based competition. As illustrated in the introduction of this chapter, the recent survey of 50 major companies finds that nearly all put time-based

strategy on their priority lists. The reason is the globalization of markets and the ensuing increase in competition caused by the migration of our economy towards an information economy from an industrial economy. The environment is much more dynamic than what is was 30 years ago. A description of two of the most important characteristics of the information economy will highlight the recent interest in competition. "The first characteristic of the business environment of the information economy is that the boundaries between industries and between market sectors are becoming increasingly fluid and blurred."[31] The second characteristic of the information economy which impacts the competitive arena is that the scanning of external business environments is more complex and demanding. Marchand and Horton explain.

> "As interdependencies between manufacturing and service industries, and between domestic and international markets increase, the task of accurately reading and gauging the pace of events and opportunities becomes more demanding. A company's competition may not arise from known competitors in traditional markets. Indeed, as the lines between market sectors blur, the range of potential competitors may grow significantly."[32]

These two characteristics of the information economy illustrate why organizations are concerned with responsiveness and therefore time-based

competition. Because it is more difficult to gauge the external environment and because competition is very keen, it is imperative for organizations to have the ability to respond quickly to environmental changes. Organizations must be able to adapt quickly or they run the risk of suffering dire consequences.

The second item which is important to understand is the "correctness" of the response. Does the correctness of the response matter? Smith does not address this issue in his research. He does believes research needs to be conducted to address this issue. However, he does believe timing may be important regardless of the response correctness. "A speedy response, even if suboptimal, may prove to be more profitable in the long run than a slow, correct response."[33] There is, however, some evidence that a faster response is more profitable in the long run even if more costs are incurred than if a response is made in the normal amount of time.

> "An economic model developed by the McKinsey & Co. management consulting firm shows that high-tech products that come to market six months late but on budget will earn 33% less profit over five years. In contrast, coming out on time and 50% over budget cuts profits only 4%."[34]

The second piece of research which sheds light on responsiveness is conducted by Pankaj Ghemawat. Ghemawat researched over 150 reports of companies which were superior performers in their respective areas. These reports were conducted by MBA students at the Harvard Business School with three objectives in mind: determine the sources of competitive advantage, determine why the advantages were sustainable, and to assess future security of the companies. Ghemawat takes a different tack in relating responsiveness to competitive advantage. Ghemawat focuses in on how to create sustainable advantage. One of the methods he describes is that sometimes competitors do not have the same options available as another and therefore effectively limiting their ability to compete. One of the restrictions on rivals options that Ghemawat mentions is response lags. Ghemawat describes the scenario.

> One business can be every bit as efficient as another in terms of potential size or access without being equally prepared to make a specific move. In that event, the nimbler of the two can count on a lag in its competitors response, or a period of sustainability.[35]

The amount of advantage gained through organizations employing time-based competition

depends on the type of response advantage they enjoy.

> Responses to most pricing moves comes in weeks if not days, while responses to nonprice competition and to R&D usually takes a few years. And it may take a decade or more to match a competitors scope economies or superior organization.[36]

Ghemawat succinctly points out that response lags to nonprice competition can lead to sustained competitive advantage over a period of years. This is the primary reason why organizations are seeking to become time-based competitors. Reducing the amount of time it takes to develop products and to bring them to market is a form of nonprice competition which is not easily copied. Also, the organizational know-how and the organizational infrastructure needed to perform this task may not be readily apparent. Furthermore, once an organization has undergone the transformation to become a time-based competitor, which is no small feat, it enjoys a superior organization to compete in today's environment. This type of organization will sustain the competitive advantage for a very long time.

Time and Frenzel's Model

Frenzel's model depicts the interrelationships between strategic thrusts, targets, and search bias. How does time-based strategy fit into this model? It should be considered as another strategic thrust. See Figure 3.1. Although Wiseman states that the thrusts of differentiation, cost, innovation, growth, and alliance are adequate to account for most of the major moves an organization makes in search for advantage, I think that time-based strategy should be included in that list. Carroll Frenzel, Professor of the Management Science and Information Systems , University of Colorado-Boulder, agrees that time is a strategic thrust. Time-based strategy is not just a passing fad, it is here to stay. Since this is a current strategy just in its infancy, only time and research will tell if it should be considered as a significant thrust worthy of inclusion in the model. One goal of this research is to determine empirically if time-based strategy should be considered a valid thrust. Interviews of managers in companies which are currently using this strategy should ascertain the validity of this proposition.

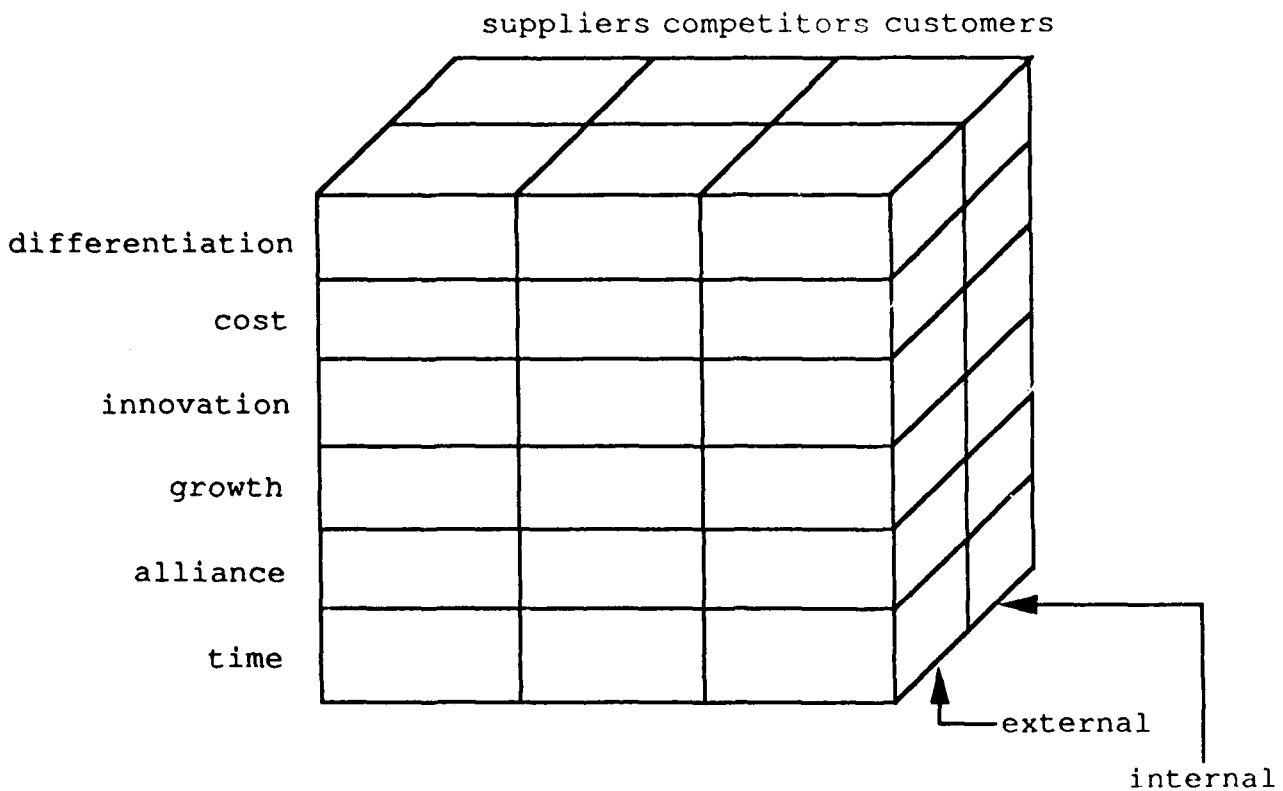

Figure 3.1. Frenzel's Model: The Integration of Strategic Influences.
Source: Carroll W. Frenzel, The Management of Information Technology, (Boulder: N.P. 1990), 64.

Carroll Frenzel defines the time thrust as "competitive advantage that is secured by rapid response to changing market conditions or by supplying a more timely flow of products or services."[37] Time-based strategy does exhibit the four properties of strategic thrusts as defined by Wiseman. Time-based strategy manifests strategic polarities, can occur in combination with other strategic thrusts, may exist in varying degrees of ordering relations, and may be related by dialectical processes. Examples and evidence of this can be found in current literature of time-based strategy. Time-based competitors do often use other thrusts in conjunction with the time thrust. Examples from the literature review show the time thrust used with thrusts of innovation, cost, and differentiation. Although no specific cases of time thrust used with thrusts of growth and alliance were observed, this is a contemporary topic and it is not unreasonable to expect a lack of such occurrences. There is also examples of organizations which have undertaken the time thrust *defensively* in response to competitors use of the time thrust *offensively*. A good example of this is General Motors drive to make their company more responsive, like a small

organization, in an effort to become more competitive in their industry which has seen them lose market share. Their use of the time thrust is defensive. Two of the competitors which are gaining market share in the auto industry are Toyota and Honda, two time-based competitors which have used the time thrust offensively.

There is also evidence that the time thrust exhibits ordering or degree relations. Some companies have used the time thrust in just part of their business activities and others have used the time thrust throughout the majority of their business activities. Of course there are companies which fall somewhere in between. This depicts the ordering property of thrusts very well. Low, medium, and high use of the time thrust. The fourth property of thrusts, that is thrusts are related by dialectical processes, is the most difficult property to demonstrate the time thrust exhibits. Since the thrust of time is contemporary, there is no evidence in literature that this thrust culminates into a dialectic relationship with the other thrusts. It is arguable that the Law of Diminishing Marginal Returns would hold for this thrust as it does for the others, thereby requiring

the dialectical process to prevail. Once a company has reached a certain efficiency and effectiveness in pursuit of the time thrust, it would be more advantageous to expend resources and efforts in another thrust. Continued effort in the time thrust would result in decreasing amounts of advantage. Furthermore, the recent interest and use of time-based strategy indicate pursuit of this strategy will lead to greater returns than additional efforts in traditional thrusts. This suggests that the use of other thrusts have culminated in the dialectic process of pursuing the time thrust.

Time and The Value Chain

The importance of the value chain as a concept has already been explained. The fact that it is a widely accepted model for describing business activities makes it a perfect model for my research. Since my research is focused on describing how time-based competitors use Information Technology in support of time strategy, the value chain model provides the framework to do so in a meaningful way. Previous researchers have already used this model to describe how IT permeates the value chain (Porter and Millar, 1985) and how

telecommunications affects the value chain (Clemons and McFarlan, 1986?). George Stalk's definition of time-based competition parallels the value chain closely. A rewording of his definition might read as follows. "How companies manage time throughout their value chain." Research into how IT supports the time strategy, within the framework provided by the value chain model, should provide a good reference for observing the relationships between IT and time-based strategy.

Very little is known on how specifically IT supports the time strategy throughout the value chain. There is, however, information available on how IT affects the value chain. This information should provide important clues on how IT supports the time strategy by illustrating the fundamental means by which IT impacts the value chain. Michael Porter and Victor Millar describes the impact of IT on the value chain.

> Information Technology is permeating the value chain at every point, transforming the way value activities are performed and the nature of the linkages among them. It is also affecting competitive scope and reshaping the way products meet buyer needs. These basic effects explain why information technology has acquired strategic significance and is different from the many other technologies businesses use.38

Porter and Millar assert that every value activity contains a physical component and an information-processing component. The physical component is described as the physical tasks required to perform the activity. The information-processing component "encompasses the steps required to capture, manipulate, and channel the data necessary to perform the activity."39 Value activities which are information intensive are prime candidates for application of IT, although every value activity can benefit from IT because every activity creates or uses information. Information Technology is also transforming the physical components of value activities. Computer Aided Manufacturing, Flexible Manufacturing Systems, and Computer Integrated Manufacturing are all examples of IT changing the physical components of activities and in the process yielding benefits of enhanced flexibility, better accuracy, and increased efficiency. Perhaps the greatest application of IT is not within value activities but between value activities. New linkages between value activities through the use of IT can provide more and better information flows throughout the value chain. Careful exploitation of these linkages can yield

better coordination between activities thereby improving the entire value chain. This is especially true with organizations whose operations and value activities are geographically separated.

Summary

This literature review of time-based competition and time-based strategy illustrates what is known and what is not known with respect to current models of competition and IT for competitive advantage. Time-based strategy was shown to be on the rise, possibly as a result of increasing competitiveness in the environment and the blurring of industry boundaries. Responsiveness, a characteristic of time-based competitors, was related to Porter's model of competition. Time-based strategy was discussed in relation to strategic thrust theory and Frenzel's model. Finally, the value chain was presented as a good framework for investigating time-based strategy and IT support of the strategy in organizations.

NOTES-CHAPTER III

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CHAPTER IV

RESEARCH METHODOLOGY

This chapter gives an overview of the research methodology. This includes how participants were selected and how the interviews were conducted.

Research Strategy

The type of research strategy which is most relevant for a particular research question depends on three conditions. "The three conditions consist of (a) the type of research question posed, (b) the extent of control an investigator has over actual behavioral events, and (c) the degree of focus on contemporary as opposed to historical events."[1] Based upon these criteria, there were two research strategies which I may have used to elicit the information required for my research. They were the case study and the survey. The information I sought required no control over behavioral events and was contemporary in nature. The discriminating difference between the two methods was the form the

research question takes. According to Robert K. Yin, author of Case Study Research: Design and Methods, survey strategies are suitable for questions which take the form of who, what, where, how many, and how much. Case strategies are suitable for how and why type questions. Since I was asking a "how" type question, the case study approach was the appropriate strategy to choose. Also, the information I sought was sufficiently complex that the short answer format of a survey would be totally inadequate.

Because my research dealt with competitive strategies and competitive advantage issues, I anticipated that firms which would agree to take part in the study may require confidentiality or anonymity. The case study method offered a good degree of flexibility in tailoring the amount of disclosure to each of the firm's wishes.

Survey Method

The information that I sought required the questioning of managers involved in IT aspects of time-based strategy. There are two different interviewing methods available to elicit interview information in a case study. They are personal

interviews and telephone interviews. Personal interviews are the most desirable of the two methods. George J. Kress, Professor of Marketing at Colorado State University, succinctly states the advantages of the personal interview.

> A major advantage of the personal interview is that it enables the interviewer to obtain maximum information. The length of the interview is not as crucial as it is in the telephone survey since most people are willing to talk at greater length in face-to-face contacts. The interviewer has the opportunity to clarify answers by observation or by continual probing. Exhibits, pictures and other visual material also can be included in the interview process.[2]

The personal interview also has several disadvantages. Personal interviews are expensive. Interviewers must also be skilled in interviewing techniques. Finally, the interviewer must take care not to bias the interviewee.

The telephone interview has its own advantages. According to George Kress, the major advantages of the telephone interview are economy and speed. A big disadvantage of telephone interviews is that it is difficult to keep interviewees on the telephone for any length of time. It's also difficult to validate the information obtained. Based upon the relative merits and demerits of the two types of interviews,

I tried to conduct as many personal interviews as possible. The remainder of the participants were interviewed over the telephone.

The interview format was another important consideration. Robert K. Yin, author of Case Study Research, identifies two types of interview formats. One is the open-ended interview. This allows the interviewer to ask for the facts of the matter as well as opinions about events. The interview is very unstructured and the direction of the interview flows from interviewee responses. The second type of interview format is the focused interview. This type of interview is conducted over a short period of time with the interviewer asking predetermined questions from a case study protocol or an interview guide. This type of interview permits maximum acquisition of pertinent information, in a shorter period of time. In addition, the focused interview remains relatively open-ended and conversational in nature. It also ensures all questions are addressed, and not forgotten. This feature is critical when multiple case studies are undertaken.

I chose the focused interview method for my interviews. I was performing multiple case studies, with some of the interviews to be made by telephone.

The focused interview matched my requirements perfectly.

Interview Process Format

All participants were initially contacted by telephone. The purpose of the study was briefly explained and copies of the research's executive summary, interview guide, and background briefs (Appendices B, C, D, and E) were made available to the participants prior to the scheduled interview. This allowed the participants to familiarize themselves with the interview's purpose and subject matter. All interviews followed the format of the interview guide. Interviews were tape recorded if consent was given by the interviewees so that the interview would flow unimpeded from transcription. Tape recordings were then later transcribed. Individual cases were then written up and given to interviewees to review for accuracy and for approval for inclusion within the report.

Analytic Strategy

The analytical strategy for verifying whether or not time-based strategy should be considered as a strategic thrust and whether or not

it should be included into Frenzel's model is straight-forward. Managers of time-based strategy were briefed on strategic thrust theory and Frenzel's model. Interviewees were then surveyed for their opinion.

Analysis of time-based strategy initiative elements and IT support of time-based strategy revolves upon pattern-matching. According to Robert K. Yin, author of Case Study Research: Design and Methods, pattern matching is one of the most desirable strategies for case study analysis. Pattern-matching logic compares an empirically based pattern with a predicted one. If the patterns coincide, then the internal validity of the case study is strengthened. The twelve elements of time-based strategy which are purported to be important are compared to actual usages of time-based competitors.

The IT support of time-based strategy portion of the research is primarily exploratory in nature. So little is known in the literature of this area, I sought to identify IT uses which support time-based strategy. Repeated observation and the search for patterns replicated among

different cases is the simple analytical strategy for this part of the research.

Selection of Participants

Time-based competition is a relatively new competitive strategy. Many of the companies which use this competitive strategy, do so to attain competitive advantage and therefore do not advertise their use of time-based strategy. Consequently, the number of companies known to use this competitive strategy is very small. A high percentage of the companies known to use time-based strategy were reluctant to take part in the study or refused outright to participate. Geographical constraints further reduced the pool of potential study participants as a significant percentage of the known time-based competitors are Japanese and European. The one artificial constraint which limited the number of participants was the researcher's limited time to contact every company. The combination of all of these factors limited the number of potential participants significantly.

Upon initiation of the study, a review of literature yielded 39 companies which were known to use time-based strategy. Twelve of these companies

are based in either Western Europe or Japan. Four of the companies could not be located (they were not identified by full name or by geographic location). Of the remaining 23 potential participants, only six companies agreed to participate. Six participants was judged to be sufficient. Case study research does not rely upon sample size as do surveys.

The firms participating in the study were all manufacturers. This was not considered a problem as 31 of the 39 known time-based competitors are manufacturers. The remaining eight firms are an assortment of retailers, distributors, and service providers. The including of only manufacturing type companies assists in limiting the number of non industry specific variables which must be taken into account and should allow for better comparisons and contrasts between participants.

Because personal interviews were preferred over telephone interviews, participant location played an important role in participant selection strategy. Companies in close proximity were contacted for personal interviews. Companies more than several hundred miles away were contacted for telephone interviews. This was a practical solution to time and money constraints. Also, since personal

interviews were preferred over telephone interviews, local companies were contacted to ascertain if they used time-based strategy. They were included in the study if they were found to be eligible and willing. Three of the study's participants were selected in this manner. Two of these three participants were contacted upon my receiving "leads" from the faculty of the Business School. Two of the personal interviews were of two separate divisions of a major corporation widely known to use a time-based strategy. This corporation was on my list of organizations known to use time-based strategy and is known for it's highly decentralized organizational structure. Divisions of this corporation are very autonomous, so I anticipated inclusion of two divisions of the same corporation to be desirable and not a problem from a sample viewpoint. The other study participants were contacted from the list of known time-based organizations.

Principal interviewees were IT Managers. IT management was desired because of their IT perspective and because of their knowledge of management policies and practices. Other management personnel were contacted as necessary for additional

information and for corroboration purposes. Other management personnel were interviewed if they were knowledgeable in the subject matter.

NOTES-CHAPTER IV

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CHAPTER V

RESEARCH RESULTS

This chapter presents the six case studies. A summary of the findings is included following the last case study.

Hewlett-Packard: Loveland

Hewlett-Packard is a leader in the electronics and computer industries. The Loveland division of Hewlett-Packard manufactures electronic test and measuring equipment. Jim Frucci, an Information Systems manager for this division, was interviewed for information of his division's use of time-based competitive strategy and Information Technology support of that strategy. Jim Frucci has eight years of experience in the IT field and two years of management experience.

Time-based Strategy

Hewlett-Packard (HP) prides itself on it's responsiveness to their customer's needs. Consequently, a major competitive strategy of

Hewlett-Packard is to increase their responsiveness to market conditions and to provide a timely flow of products and services. Frucci agrees that their division's strategy of reducing time to market and reducing break even times is a valid strategic thrust. He also thinks that the time thrust definitely belongs in Frenzel's model. The time thrust is every bit as important to HP as the cost thrust, and is definitely more important than the other thrusts included in the model. The time thrust has been actively pursued by HP for a year now. According to Frucci, Hewlett- Packard has already secured competitive advantage through their use of the time thrust and the advantage gained is long-term.

Frucci states that Hewlett-Packard's use of the time thrust is offensive in nature. HP intends to gain competitive advantage over its competitors. However, he admits initial use of the strategy is a result of competition from time-based competitors. Therefore, HP initially used the time thrust defensively to reduce the advantage of time-based competitors. Frucci believes that the time thrust and the cost thrust, the other major thrust his division pursues, go hand in hand. Fast and

efficient processes, which result from use of the time thrust, yields HP terrific cost benefits.

Time Thrust Initiatives

Redesign of manufacturing processes plays a major role in Hewlett-Packard's time thrust. HP has a three part process to attain their goal of having timely and efficient processes. First, they look to see if they can eliminate the process. If they cannot eliminate the process, they try to simplify the process. If simplification of the process is not possible, then they try to automate the process. This three step process contributes significantly towards HP's time thrust. Frucci states that this three step process is extremely crucial to Hewlett-Packard's success.

HP actively pursues reduction of administrative delays which can slow business activities. Putting decision-making at the level closest to the process is very important to HP.

HP heavily uses empowered teams. These teams provide two important benefits to HP. The first benefit teams gives HP is that it reduces administrative delays. HP gives these teams the responsibility and authority to change and/or correct processes and procedures for which they are

responsible, without involving management. This provides significant time benefits. Secondly, it fosters better intracompany communications as these teams are often composed of individuals from different functional areas. These teams can prevent costly and timely mistakes from occurring due to miscommunication or lack of communication between functional areas. However, there are problems associated with HP's use of empowered teams. Some managers are reluctant to hand over responsibility and authority to a work group which may not have "the big picture" when they are still responsible for their work unit's accomplishments. Also, use of teams works far better in some areas than others. Although HP has some problems transitioning to multifunctional team use, HP is committed to the use of teams. HP feels that increased teamwork is essential for survival in today's global economy.

HP stresses time schedule adherence, especially in product development and product manufacturing. Frucci believes that schedule adherence is critical for their time-to-market strategy. HP also keeps track of manufacturing and product development cycle times so they have a history of cycle times.

HP has set high standards for their use of the time thrust. HP wants to be the best in class and has set their goals and standards accordingly. Their strategy for attaining these high standards is by making incremental improvements over time.

HP believes interpersonal communications is extremely vital to its productivity. However, there are several problems associated with interpersonal communications within HP. HP is a highly technical company which employs a high percentage of engineers. Engineers often do not have the educational background or training in inter-personal communications skills as individuals in non-technical areas. Engineers also have their own "language" particular to their discipline. These factors often cause problems within HP. HP is trying to address these problems through some of their training programs.

HP Loveland currently does not specifically evaluate capital budgeting proposals with respect to its time thrust. Frucci believes HP could do a much better job relating capital budgeting criteria to overall corporate goals and objectives.

HP Loveland currently does not have any training programs or education programs aimed

prepared specifically for time-based competition, except their training for teams in empowerment. There is however, a extensive retraining effort underway at HP, focused on individual skills. HP believes that individual personal productivity will be very crucial to their company in a global marketplace and in a shrinking labor market. HP offers many human resources type courses to help better communications within the company.

Frucci believes that HP's company culture plays an important role in their success. HP attention and responsiveness to the customer has never been greater.

IT Support

Frucci says IT is critical to the success of HP's time thrust. IT plays a leading role in HP's time thrust, whereas, it only plays a supporting role in their smaller thrusts of differentiation and innovation. The following discussion provides a look at how HP supports its time thrust by value activity.

Inbound logistics. HP uses some of the JIT concepts. HP strives to build excellent relationships with its suppliers so it may leverage

these relationships into information flows and good flows which arrive as they are needed. This diminishes inventory costs and provides suppliers which are responsive to HP. EDI supports HP's objectives very well in this activity. These supplier relationships are critical to HP and EDI plays a vital role in the rapid flow of information between HP and their suppliers.

Operations. IT plays an prominent role in HP's operations value activity. HP uses a manufacturing concept called KanBan which enhances their manufacturing. KanBan makes use of intermediate buffers in their manufacturing line. Parts or components are not produced unless the buffer is empty. Production stops once the buffer is filled to its prescribed level. KanBan allows for a smooth manufacturing process, without unnecessary inventory levels. Frucci describes this manufacturing process as being customer driven rather than production driven. IT provides the essential information flows required from this tightly knit manufacturing process linking information from inbound logistics, operations, and marketing & sales value activities.

Outbound logistics. HP has more Information Systems support focused on shipping and order administration than any of the other value activities. Frucci states that this results from HP's desire to be responsive to their customers as these value activities are close to their customers. Frucci believes that IT plays an indispensable role in these value activities, although it is a supporting role. Information systems allow for accurate tracking of orders, order status and shipping information. Although many other companies also have similar systems in use, it is essential to HP for providing quick and accurate shipments to their customers.

Marketing and sales. IT does offer HP some competitive advantages in this value activity. IT aides in the planning aspect of this activity. Sales forecasts are made assisted by information systems. According to Frucci, the information systems available to the marketing and sales personnel provide them with superb tools for making sales forecasts. As mentioned in the previous section, IT is integral to this activity by ensuring a quick and efficient order processing system is

available to this activities staff and HP's customers.

Service. IT plays a general support role in this value activity. Service information and product defect information are collated and analyzed to assist in providing better service to HP's customers. HP has no specific IT applications which support the time thrust in this activity.

Infrastructure. E-Mail and voice mail are two IT applications which Frucci says supports HP's time thrust tremendously. They enhance interpersonal communications very well and eliminates time delays caused by "telephone tag". Frucci said that many time consuming personal meetings can be avoided by using these systems. Detailed voice messages and written records are forwarded through these systems.

Human resource management. HP has put together an extensive career resource center which indirectly supports their time thrust. Job position availability, job descriptions, and skill requirements are available from this information system. Frucci believes this system is invaluable for matching people and job openings within HP.

Getting the right people in the right jobs and at the right time aides tremendously at the individual productivity level.

Technology development. CAD plays a significant role in HP's development of technologies and design of products. The ability to transfer CAD data to other platforms, such as CAM/CIM equipment, gives tremendous time savings in design and manufacturing activities. The integration of these two activities is extremely important to HP.

Procurement. There are no IT applications in this activity which support the time thrust.

STORAGE TECHNOLOGY CORPORATION

StorageTek is an internationally known manufacturer of IBM-compatible computer peripherals. StorageTek main products are it's tape-storage devices, disk drives, and printers. Warren Edris, Manager of Corporate Quality, was interviewed for information about his corporation's use of time-based strategy and information of IT support of that strategy. Warren Edris has unique qualifications for this interview. He served two years as special assistant to the Chairman of StorageTek before his

current position. This experience has provided Warren with magnificent insight and knowledge of corporate strategy and objectives of StorageTek. Mr. Edris has 12 years of management experience.

Time-based Strategy

Mr. Edris believes that time-based strategy is a strategic thrust. Mr. Edris also believes the time thrust definitely belongs in Frenzel's model. The time thrust is a major strategy of StorageTek, along with the differentiation thrust (quality). Even though StorageTek's use of the time thrust is relatively recent, it's use has already secured them competitive advantage.

Mr. Edris states that his company's has used the time thrust both offensively and defensively, depending upon the product and on the market. It has enabled StorageTek to lesson competitors advantages in some areas and has allowed StorageTek to gain advantages in other areas. Mr. Edris believes that the time thrust and the differentiation thrust (quality) are tightly linked. He firmly believes that a focus on quality in the business process will also yield tremendous time savings.

Time Thrust Initiatives

StorageTek places much attention on ensuring processes within their company are efficient, timely, and effective. Mr. Edris believes that you can't improve quality or reduce cycle times without redesigning your processes. Furthermore, Warren Edris also believes that better time management is the product of quality improvement. This tight linkage between the thrusts of time and quality hinge upon process design and management. StorageTek has developed and is now implementing a program called Quality Improvement Process (QIP). This initiative has the two-fold purpose of improving quality and reducing process time by improving processes. StorageTek developed the quality improvement process with the assistance of the Boston Consulting Group and the Thomas Group consulting firm. These two consulting groups specialize in time-based competition and also in quality management. StorageTek has also studied other company's manufacturing processes and designs. Some of these companies, such as Honda of America, Hitachi, and Motorola, are well-known for their quality manufacturing and fast-cycle capability.

While this initiative is still in it's infancy, it has produced good results in quality

improvements and in cycle-time reductions. Upon full implementation of the Quality Improvement process, StorageTek expects to realize impressive quality improvements and greatly reduced cycle times. This element of time-based strategy is vital to StorageTek's time thrust.

StorageTek is reducing administrative delays within the company which may slow down processes. They call this initiative resolve or escalate. This initiative involves resolving problems at the level they occur. If the problem involves a link with other functional areas, an outside process, or a large amount of money, then the problem is escalated to the appropriate level. This policy allows persons most familiar with a process to be responsible for it. This policy has resulted in huge time and cost savings from reduced cycle times.

StorageTek believes that multifunctional teams are very important to both their time thrust and their quality thrust. StorageTek is exploiting the use of multifunctional teams for a couple of reasons. StorageTek wishes to break down unproductive functional and/or divisional rivalries and replace those loyalties by allegiances to products and services. StorageTek also wants to

prevent design flaws which may result in costly problems later on in manufacturing of a product or in service of the product. A good example of this was the omission of engineering personnel responsible for power supplies in the design of a new product. When the time came to integrate the power supply into the product, the design engineers discovered that no standard power supplies would fit. This required a costly redesign of a power supply resulting in a cost 2-3 times more than a standard power supply. To prevent such occurrences from happening again, StorageTek started the Design for Manufacturability initiative one year ago. This initiative requires the use of multifunctional teams made up of members from design engineering, manufacturing, field engineering, purchasing, logistics, and product engineering.

StorageTek does stress time schedule adherence. Warren Edris says that managing by schedule is the overriding concern although not at the sake of quality.

StorageTek also tracks cycle times. Information systems provide support to this element of time-based strategy. StorageTek is also developing a software program to perform critical

path analysis of variations in processes. StorageTek expects this tool to aide in identifying areas which need time management attention.

Raising standards is important to StorageTek. Warren Edris points out that it is important to set high, yet attainable standards. StorageTek first baselines itself, that is, it self assesses where they stand. Then they look to benchmark themselves against the best in class. Best in class is not necessarily within their specific industry. StorageTek made their engineering change process as good as possible by themselves. They then studied Navistar International's engineering change process, which they thought was one of the best. Navistar International is a manufacturer of diesel engines and farm equipment. StorageTek then improved their engineering change process based upon their study of Navistar's process. Another example of raising standards can be found within teams. Team members are allowed to set their own goals. These goals are often higher than what individuals would set for themselves.

StorageTek is striving to provide clear lines of communications within their company. This

emphasis on communications speeds up internal communications and breaks down communication barriers. StorageTek is working to create internal partnerships within the company. StorageTek identifies supplier and customer relationships and then establishes requirements between the functional areas. Afterwards, formal reviews of requirements are made every three months. This policy produces clear and strong lines of communication within the company.

Although capital budgeting criteria does not consider time-based strategy now, provisions for this eventuality is in the Quality Improvement Process currently being implemented.

StorageTek has no provisions for altering incentive structures in support of time-based strategy.

StorageTek believes the education of their people in their Quality Improvement Process is essential. For the last 18 months, StorageTek has undergone QIP self-assessment. During the next 24 months, everyone in the company from the chairman of the board down, will take a 3 day course on QIP. This course will educate StorageTek personnel about QIP and the reasons for its use. Mr. Edris calls

this cascade training. Cascade training has been shown to be very effective.

Mr. Edris believes StorageTek's company culture is changing to reflect their commitment to responsiveness and quality. However, this evolution is quite slow.

IT Support

Mr. Edris states that IT is very important to StorageTek's time thrust. IT can provide terrific benefits in both time and quality. However, automated processes supported by IT, must be good processes prior to automation. Automating a not so good process will provide not so good results. Understanding of processes is key. A breakout of IT support by value activity is given below. Mr. Edris states that no particular value activity is more important than any others. What is important to StorageTek, is the linkages between value activities. This is where IT can have the biggest impact.

Inbound logistics. JIT concepts supports the time thrust in this value activity. StorageTek is currently implementing JIT. StorageTek expects to reduce the time it takes to receive parts from

it's suppliers as well as reducing inventory costs. One concern of StorageTek is that of quality of parts received from suppliers. Since quality is a major thrust of StorageTek, they need to ensure quality starts with the components they receive from their suppliers. Materials Resource Planning (MRP II) is also being implemented to provide additional time benefits. StorageTek expects this on-line system to provide substantial time savings as well as great planning benefits.

Operations. CAM/CIM is vital to StorageTek's operations activity. CAM provides many benefits to StorageTek of which one is reduced manufacturing times. StorageTek is currently looking at CIM to increase their capabilities in operations.

Infrastructure. StorageTek uses voice mail and electronic mail in their company to increase responsiveness and to speed the flow of information within their company. These IT applications have supported the time thrust tremendously.

Technology development. CAD/CAE and CASE all provide great time-savings within the technology development activity. CAD/CAE greatly speed up the

design and engineering time required to perform these activities. Transfer of this data to operations in the format the CAM/CIM machinery uses also provides tremendous time savings. CASE provides great time savings in software development times. This impacts the responsiveness of the IS community and system development times.

All other activities have no IT applications which are relevant to time-based strategy at this point in time. As StorageTek is just embarking upon the use of time-based strategy, Edris believes IT applications in support of this strategy will grow.

Hewlett-Packard: Fort Collins

The Fort Collins site of Hewlett Packard (HP) manufactures the Series 300 technical workstations. Ray Padilla, Steve Livingston, and Terry Clark were interviewed for information of Hewlett-Packard's use of time-based strategy and information of how IT supports time-based strategy. All three interviewees are part of the Site Support organization of Fort Collins. Ray Padilla is the Fort Collins Site Telecommunications Manager as well as the Colorado Geographic Network Coordinator. Mr. Padilla has six years of IT experience and eleven

years of management experience. Mr. Clark is the Telecommunications Operations Manager and Mr. Livingston is the Telecommunications Engineering Manager. Mr. Clark and Mr. Livingston were included in the interview to provide additional input and expertise.

Time-based Strategy

Mr. Padilla believes that time-based strategy is a strategic thrust. He also believes that the time thrust belongs in Frenzel's model. Although their use of the time thrust isn't as important to their business as their innovation thrust, it is very important in support of their innovation thrust. HP has used the time thrust for the last 10 years and it's use has given HP competitive advantage. HP uses the time thrust because they want to be competitive in markets which are very dynamic.

HP considers its thrusts of innovation and differentiation to be major in magnitude and the time thrust to be medium in magnitude. Two good examples of how the time thrust has given HP advantage are the HP 486 Vectra and the HP Laserjet III. HP time-based their 486 Vectra development and production. As a result, they were able to preempt

the market place for 486 based microcomputers. The time thrust was also vital in supporting HP's innovation thrust. Delivering this product to the market before any of their competitors, furthers HP's image as being an innovative company. The second example is their Laserjet printer. The Laserjet printer has set the standard for laser printers since it's introduction. As soon as competitors introduce competitive models, HP moves the standard higher by producing another version of the Laserjet. The combination of progressively innovative products and time-based strategy allows HP to lead this market.

HP's intentions for using the time thrust vary depending upon the market. In some markets they use the thrust offensively to gain or sustain competitive advantage. In other markets the use the time thrust to lesson advantages their competitors enjoy.

Time Thrust Initiatives

Redesign of business processes play an important role in the time thrust only if the processes need improvement. The interviewees believe that if it isn't broke, then don't fix it. HP's Japanese affiliate 10 years ago did set out to

redesign their R & D process and their manufacturing process. Their changes resulted in a decrease in cycle times from weeks to just a couple of days. These changes gave their affiliate competitive advantage.

HP is reducing administrative delays. Everyone receive total quality control training. HP pushes authority and responsibility down to the lowest possible level. It is everyone's job and responsibility to improve their own processes.

The use of Multifunctional teams is very important to HP. HP has emphasized this element of time-based strategy for the last five years. This migration from individual projects to team projects has given HP some synergistic benefits. Mr. Padillo believes this trend towards multifunctional teams is a result of their company evolving from an instrument company to a computer company. HP needs to be a solution provider and not just a manufacturer of equipment. This evolution requires a more integrated approach to business.

HP stress's time schedule adherence. This element of time-based strategy is receiving more and more attention as the company becomes more and more

integrated. This element is also important for HP meeting windows of opportunities for their products.

HP also tracks cycle times. Measurements drive HP and cycle times is one example. One example of HP's tracking cycle times is in the telecommunications operations area. HP monitors service request cycle times to ensure their customers receive prompt service. HP seeks out Service improvements which result in shortened cycle times. Current average service installation times from request time is now only 1.5 days.

HP is continually raising standards within their company. A good example is the goal of cutting in half breakeven times within their company. Raising standards is also important to maintain their "leader" status within their industry and product lines. Raising standards is important to the time thrust and it is measurable from customer reactions and feedback.

HP provides internal training for their personnel in interpersonal communications. E-mail, voice mail, videoconferencing, and telephones all support HP's emphasis on communications. Company policies also reflect this emphasis on communications. "Open door" policies and working

relationships, characterized by a first name basis, support open communication.

There were no formal changes made to the capital budgeting criteria to reinforce the time thrust. However there is encouragement for people to submit proposals which support the time thrust.

HP has modified their incentive structures in support of the time thrust. HP currently rewards their personnel through their pay for performance policy. However, HP now provides team rewards to recognize outstanding team performances.

Classes in time-based strategy were provided for manufacturing personnel. Education of time-based strategy in other areas occurred in a filtering down process. HP also offers training in coaching and in team building.

Mr. Padillo believes that his company's culture is evolving towards an integrated company from a highly individualistic company. Their company culture is very supportive of time-based strategy. HP has always tried to act like a small company within a large company. This enables HP to be very responsive.

IT Support

Mr. Padilla believes that IT is absolutely crucial to HP's time thrust. The use of the time thrust, supported by IT, has given HP competitive advantage. Mr. Padilla gives some IT applications which are instrumental to the time thrust in their company.

Inbound Logistics. JIT links with suppliers are important to the time thrust but not as important as it is for cost. JIT does make it easier to order and track parts. It also limits the inventory required to be on hand for manufacturing.

Operations. HP does use CIM to a limited extent. A major effort is under way in HP to expand their use of this technology. A system in use now which supports the time thrust in the operations activity is HP's Build to Order system. HP developed this system 5 years ago to quicken the configuration and development of their series 300 workstations. It would be to costly to manufacture and maintain an inventory of all of the possible configurations of the workstation. The use of this system has allowed HP to reduce the time required to ship the order from order receipt. This process now

takes only two days where before it took two weeks. from two weeks to two days.

Outbound Logistics. HP has very few distribution centers. They do have a Final Assembly and Systems Test center for assembling and testing some of their products prior to shipment to their customers. There is also a high-tech distribution center for HP's personal computers. This center matches personal computers with customer orders. Other than these mentioned centers, there is little IT support of the time thrust in this activity.

Marketing & Sales. HP has equipped their sales personnel with cellular telephones and laptop computers. These IT applications aide the sales staff tremendously by providing immediate access to HP resources. The laptops facilitate quick order taking and also aide in displaying system configuration options and system pricing. STARS is another system which aides this activity. Stars is a system in which customers call in problems and concerns with HP's products. HP stores and analyzes this data to get valuable service information. The information derived from this system is then incorporated into future product designs. This

system enables quick feedback from customers and quick incorporation of feedback information into the product design process.

Service. HP has an on-line information system which system engineers can access for service information. This system also maintains maintenance logs, predicted failure information, and preventative maintenance information. This system ensures quick and knowledgeable service to HP customers.

Infrastructure. HP has many IT applications which support the time thrust in this value activity. HP has a worldwide digital network to transport video, voice and data. HP also has one of the world's largest X.25 networks. These networks provide invaluable support for HP's highly decentralized operations. Key applications which support the time thrust include voice mail, electronic mail, and videoconferencing. Mr. Padillo explains that videoconferencing is playing an increasingly important role as videoconferencing equipment costs and network costs have declined to a point where videoconferencing is very attractive. HP has 3 videoconferencing rooms in Fort Collins

alone. These rooms allow entire teams to meet from widely scattered locations. Time savings and cost savings are just some of the advantages gained from this system. Voice mail is another time-saving IT application. The company favors this technology tremendously. Customer reaction to voice mail has been nothing but favorable. Voice mail produces excellent time savings for its customers.

Human Resource Management. There are no IT applications in this activity which support the time thrust.

Technology Development. CAD plays an important role in this activity. CAD provides significant time savings within the product design process. IT also provides HP with tremendous advantages is its ability to provide database sharing and updating through it's Internet. This net allows updates to occur throughout the network over night so workers can have up to date information to work with first thing in the morning.

Procurement. HP does not have any IT applications which support this value activity other than an on-line procurement system which provides HP some cost savings. This system does provide some

time savings for this activity although that is not the primary intent of the system.

MARTIN MARIETTA AEROSPACE

Martin Marietta Aerospace is a major producer of rockets and spacecraft. Martin Marietta made the famous space probe Magellan. Rolland Rounds, Director of Information Systems, was interviewed for information relative to his company's use of time-based strategy and IT support of that strategy. Mr. Rounds has 22 years of IT experience and 20 years of management experience.

Time-based Strategy

Mr. Rounds believes that time-based strategy is a strategic thrust. Mr. Rounds also believes that the time thrust belongs in Frenzel's model. Although Martin Marietta's use of the time thrust is medium in strength, they have actively pursued the time thrust since 1986. Martin Marietta pursued this strategy in search of gaining competitive advantage. Their use of time thrust has resulted in competitive advantage for Martin Marietta. Mr. Rounds believes employing the time thrust will provide significant long-term advantage for his company. His company has received many letters from

satisfied customers, praising Martin Marietta's responsiveness.

Martin Marietta's major strategic thrusts are the thrusts of cost, differentiation, and alliances. The strategic thrust of innovation is medium in strength. The reason for Martin Marietta's major focus on differentiation, cost, and alliances is because substantial business comes from government contracts. Time thrusts do not give any advantages when time frames for letting contracts is fixed for all competitors. The one advantage that the time thrust does give Martin Marietta in government contracts, is use of the allotted time more effectively. Criteria for government contracts hinge on cost and quality (specifications). This explains Martin Marietta's major thrusts of differentiation (quality) and cost. Mr. Rounds also believes the thrusts of quality and cost helps Martin Marietta to win and keep customers. The strategic thrust of alliances is also strategically important to Martin Marietta. Alliances with suppliers, contractors, sub-contractors, and even competitors are necessary for Martin Marietta to compete within its industry.

The time thrust supports nongovernmental contract business very well. Mr. Rounds also points out the time thrust gives Martin Marietta great cost advantages in all aspects of their business, which aides their cost thrust tremendously.

Time Thrust Initiatives

Process analysis is central to Martin Marietta's time thrust. Processes are analyzed for simplification. Martin Marietta also analyzes all processes before automation. Martin Marietta configures process automation around IT as much as possible. This element of the time thrust yields tremendous time and cost savings.

Martin Marietta is now attacking administrative delays by seeking to flatten the organization structure. Another initiative of Martin Marietta's is the use of high performance work teams. High performance work teams also reduce administrative delays.

As just mentioned, Martin Marietta uses multifunctional teams to perform some work. The transition to using multifunctional teams to perform most work is still in it's infancy. Also, the transition has not been without its problems. Mr. Rounds says that managers are often reluctant to

give team members responsibility and authority. Furthermore, team members are often unwilling to accept responsibility. However, Martin Marietta is still committed to use of these teams.

Martin Marietta stresses time schedule adherence. This is an essential part of their time thrust. Because Martin Marietta performs terrific quantities of work in teams, often with team members from other companies, it's doubly important for Martin Marietta to abide by their own schedules.

Martin Marietta continually benchmarks itself with their own standards and with their competitors standards. Consequently, Martin Marietta tracks cycle times and other performance measures relevant to their overall strategies.

Martin Marietta is continually raising their standards. Their goal is to make continuous improvements over old benchmark standards. This is an overall corporate goal and is not just related to their time thrust.

Martin Marietta is actively pursuing better internal communications. The use of multi-functional teams is one method. Other initiatives Martin Marietta has in support of this element is the upgrade of their Electronic mail network and

Local Area Networks. Martin Marietta is also in the process of looking into developing an Executive Information System with an up to date database management system and comprehensive data dictionary. All of these initiatives upgrade internal communications within Martin Marietta.

Martin Marietta does consider it's time thrust in it's capital budgeting criteria. In fact, Martin Marietta maps it's long range operating plan, capital plan, and information systems plan together. This integration of plans ensures information systems and capital expenditures support strategic objectives, including their time thrust.

There are no formal incentive programs which support the time thrust other than their suggestion program. This program provides rewards for suggestions which improve any of Martin Marietta's policies, practices, or procedures.

People at Martin Marietta were educated on their companies use of the time thrust, although not formally. Senior Management at Martin Marietta Aerospace and senior management from their corporate headquarters in Bethesda, Maryland have made their commitment to time-based strategy well known through talks and through their actions. These actions have

filtered down through management and to all workers. Formal training has been accomplished in several areas in support of time-based strategy. High performance work teams training is taking place. The goal is to be sure everyone attends either a two day or six day course. Martin Marietta also provides training in empowerment and risk-taking. Another substantial training initiative in support of the time thrust, is the courses in process modeling and process simplification.

Martin Marietta's company culture does take time-based strategy to heart. In fact, Mr. Rounds believes Martin Marietta takes this strategy to heart to almost a fault, risking other objectives and goals.

IT Support

Mr. Rounds states that Information Technology is key to their time thrust. The combination of IT and process analysis and design contribute the most to their time thrust. A picture of how IT supports the time thrust by value activity, is now given.

Inbound logistics. Martin Marietta uses some of the elements of JIT . Martin Marietta is

also implementing MRP II with a goal of attaining class A status. Electronic Data Interchange (EDI) also plays a prominent role in Martin Marietta's time thrust in inbound logistics. Martin Marietta's use of EDI is just beginning. Because of the advantages and benefits received from their current use of EDI, they have a goal to increase EDI use. Mr. Rounds believes that increased EDI use is a must.

MRP II is being implemented now. Martin Marietta has a class A goal for MRP II. Martin Marietta expects this planning system to provide significant time savings.

Operations. IT plays a vital role in specifications for CAM/CIM. CAD specification data from CAD developed designs is then transferred to CAM/CIM equipment. This greatly shortens the time needed to produce items. Mr. Rounds states that this linkage between operations and technology development is most vital to their company. Another important role IT plays in operations is in the management of in-process inventory and job scheduling and reporting. All of these IT applications contribute considerably to the time thrust in operations.

Outbound Logistics. Information Technology is essential in support of time-based strategy in this activity. Much of Martin Marietta's business involves contracts which span years. Providing customers timely information and status reports is a primary task. Martin Marietta is currently implementing the Computer Assisted Logistics and Acquisition System (CALS). CALS is a government initiative aimed at providing electronic communications between Martin Marietta and Government agencies. This is an important system for Martin Marietta as it will soon be a contractual requirement for future government contracts. Information Technology is indispensable for ensuring future business for Martin Marietta and also for providing accurate and timely status reporting for Martin Marietta's customers.

Marketing & sales. There isn't much IT support for the time thrust in marketing and sales other than a marketing database available to Martin Marietta's marketing personnel. This database keeps track of customer information and calls for the marketing department.

Service. The service activity has an information system available for job scheduling and job reporting. This system speeds up the service activity and ensures timely service to their customers.

Infrastructure. Martin Marietta supports the time thrust in many ways in their corporate infrastructure. Electronic mail and voice mail aide tremendously in the speeding of information flow throughout their company. Videoconferencing also provides Martin Marietta great time savings and impressive cost savings. IT systems in finance, cost management, and quality management provides Martin Marietta with timely and accurate information for these functions. Perhaps most significant, in terms of IT contribution towards the time thrust, is Martin Marietta's use of IT in its planning and scheduling activities. These systems ensure efficient operations and use of corporate resources. These systems also cut out planning and scheduling inefficiencies, thereby reducing wasteful "dead times".

Human resource management. There are not any IT applications pertinent to the time thrust in the human resource management activity.

Technology development. The technology development activity does have an IT application which supports the time thrust. Martin Marietta uses CAD. Mr. Rounds points out that this application supports not only the time thrust, but also their other thrusts of cost and differentiation (quality). CAD shortens the time required for design work.

Procurement. Martin Marietta has an on-line procurement system which provides tremendous time savings over the old manual system.

Navistar International

Navistar International is a manufacturer of mid-range diesel engines for both itself and also for OEM truck manufacturers. Navistar also manufactures medium duty and heavy duty trucks. John Bowyer, the Director of International Process Management, was interviewed for information about his company's use of time-based strategy and IT

support of the strategy. Mr. Bowyer has 28 years of management experience and 24 years of IT experience.

Time-based Strategy

Time-based strategy is a major strategic initiative of Navistar. This initiative impacts nearly all of Navistar's activities. Mr. Bowyer believes that time is a valid strategic thrust. He also thinks that time definitely belongs in the model. Mr. Bowyer also believes that time could be a stand alone thrust or it can support a number of the other thrusts. Time thrust may support differentiation, innovation, or growth thrusts. Mr. Bowyer also believes that time is cost and that the two thrusts are tightly linked.

Navistar has used the time thrust for about three years. The use of this thrust has given Navistar competitive advantage in some areas and has lessoned the competitive advantage of customers in other areas. This competitive advantage gained can be long-term if the company continually pushes the strategy and takes advantage of opportunities as they occur.

Other major strategic thrusts which are important to Navistar include alliances and differentiation, through attention to their

customers and attention to quality. Alliances with suppliers and competitors are an important part of Navistar's corporate strategy.

According to Mr. Bowyer, the time thrust is critical in differentiating Navistar from their competitors when products are similar. Major differences between companies with similar products are often in customer service and in delivery of products.

Time Thrust Initiatives

Process design and management of processes with respect to the time thrust is extremely critical to Navistar.

The reduction of administrative delays is also essential to Navistar's time thrust. Navistar strives to put decision making at the level the process occurs.

Cross-functional teams are an important element of Navistar's time thrust. The goal is to change the view from a vertical perspective to a horizontal perspective in which work is usually accomplished. Cross-functional teams are used at the operations level are used to effect changes or to perform work in teams involving alliances. Although performing and evaluating work in teams is

often a new and difficult experience for team members, it is good for breaking down traditional organizational barriers.

Navistar does stress time schedule adherence, but not at the sake of other corporate thrusts. Mr. Bowyer believes that the schedule must be a good schedule before you can hold people responsible.

Navistar does track cycle times. This element is very important for time-based strategy and it requires sensitive feedback mechanisms. Navistar uses IS systems to assist in this task.

Navistar continually raises its standards. Benchmarking goes on continually within Navistar.

Navistar emphasizes interpersonal communications. They do this through team building, continuous improvement teams, and through Deming Seminars.

Navistar currently does not emphasize the time thrust through capital budgeting criteria or by altering personal incentives.

There have been a number of training sessions at all levels to discuss missions and linkages between missions and strategic initiatives, including the time thrust.

Navistar's company culture is slowly evolving towards becoming more speedy and responsive. Navistar is wanting it to happen and they are working to realize that goal.

IT Support

IT is essential to Navistar's time thrust. Mr. Bowyers states that you can't execute the time thrust without IT. You need systems and telecommunications to support the time thrust. Navistar's IT support of the time thrust is shown below by each value activity. Important linkages between value activities for Navistar are linkages between operations, technology development, and marketing & sales.

Inbound logistics. IT is fundamental and critical to this activity. Electronic Data Interchange (EDI) is extremely important for providing integrated efforts between Navistar and its suppliers. This IT application speeds up this activity significantly. EDI presents a win/win situation for both Navistar and Navistar's suppliers, with both parties receiving benefits. Another IT application which supports the time thrust especially well is identifier technology.

Bar coding provides significant time savings as well as essentially error free operation.

Operations. Navistar has a robotic paint facility in Springfield, Ohio which provides significant time savings. This facility is electronically fed by the order database. This compresses the time required from order taking to finished product. This facility paints truck hoods and other trim.

Outbound logistics. Navistar has an IT application which pairs a product to a customer and determines the route for delivery. This application also considers secondary movement as required. This application reduces the time required to perform this activity.

Marketing & Sales. Navistar is developing a new system called Order Create. This system is more user friendly and more complete than the current on-line system. Navistar designed this system to support field sales representatives. This system aides in specification of trucks and aides in determining the buildability of trucks meeting customer requirements. This system will allow representatives, on the spot with their customers,

to determine possible delivery dates with various options required by the customer. Mr. Bowyers believes that the principal benefit of this system other than the reducing the time required to place an order, is the fact that the customer participates in the order process more fully.

Service. Navistar is implementing a system called Tech Central which will handle extraordinary repairs. This system provides both electronic data access and telephone access to information on extraordinary repairs. This system will provide feedback for customers, dealers, and also for Navistar about repair problems as they occur.

Infrastructure. Navistar uses value-added networks, networks to link production facilities, and telephone messaging systems to support the time thrust. Navistar also uses a node-messaging system to speed internal communications. These systems, especially the node-messaging system provide tremendous time savings internally within the company.

Human Resource Management. Navistar currently has no IT applications within the Human

Resource management activity which supports the time thrust.

Technology Development. Navistar uses Cad to perform all design work. CAD provides quality time-savings within this activity.

Procurement. Navistar has no systems in this activity which support the time thrust.

Northern Telecom Inc.

Northern Telecom Inc. (NTI) is a leading manufacturer of telecommunications equipment in the telecommunications industry. Robert Badelt, Assistant Vice President of Manufacturing NTI, was interviewed for information of his corporation's use of time-based strategy and Information Technology (IT) support of that strategy. Robert Badelt has 28 years of management experience of which 18 years are with NTI. Brian Murphy, Public Relations Manager for NTI, also supplied information of NTI's IT support of time-based strategy.

Time-based Strategy

Mr. Badelt thinks time-based strategy is a strategic thrust. He also believes that the time thrust should be included in Frenzel's model. The

time thrust is particularly critical for NTI. The telecommunications industry is undergoing deregulation and markets are changing dramatically. Competition is greater due to a growing global economy. Technology is also rapidly forging ahead. These three factors necessitate a time-based strategy for NTI.

NTI has used the time thrust since 1985, although NTI started to squeeze time out of its processes back in 1980. NTI asked the question, "What do we need to do to become world class competitors?" NTI determined that they need to be responsive to market conditions and customers, to provide a quality product, and deliver the product at a good cost. These requirements led to NTI's use of the time thrust, cost thrust and differentiation thrust (quality). Mr. Badelt points out that time is intrinsically related to the thrusts of cost, innovation, and differentiation. NTI's time thrust reinforces its other thrusts. If a company can respond quickly, there is less overhead and therefore less cost. Companies which use the innovation thrust must get their products to market in time in order to capitalize upon their innovative products. Mr. Badelt also points out that companies

which use the time thrust help differentiate themselves by use of that thrust.

Mr. Badelt says that there is no question that NTI's use of the time thrust has given them competitive advantage. NTI's customers also believe NTI has gained competitive advantage. NTI develops very close relationships with its customers. NTI now strives to include customers within NTI's processes, especially in product definition.

Time Thrust Initiatives

Redesign of business processes, such as the product introduction process, is essential to NTI's time thrust. NTI strives to do things simultaneously as much as possible to compress the time required to perform business processes. NTI also eliminates functional boundaries where possible and eliminates non value-added activities which slow down business processes. These initiatives speed up business processes tremendously.

NTI is actively cutting out administrative delays which slow down business activities. NTI pushes responsibility and authority down to the lowest possible levels. NTI has one plant which is operated by a self-directed workforce, with other plants moving towards this type of management. This

workforce is responsible for self-management, improving quality, improving processes, and meeting time schedules. This has worked very well for NTI. Mr. Badelt says that it is getting to the point where managers don't manage, supervisors don't supervise, and directors don't direct.

Mr. Badelt states that their organization chart should look like an upside down pyramid, with the first line personnel at the top and the senior executives at the bottom. This fits in with NTI's desire to get everyone in touch with the customer. The individuals whom have contact with the customers, first line personnel, are most important. The bottom layers of the pyramids function is to support the personnel in touch with the customer.

Self-directed workforces and the focus on the customer are two measures which NTI uses to reduce administrative delays.

Teams are very critical to NTI's time thrust. Mr. Badelt says that most business processes extend beyond functional areas. Therefore NTI is doing everything they can to deemphasize functional boundaries. One way of doing this is the use of multifunctional teams. NTI not only uses teams in their major processes, such as product

introduction, but also in their corporate headquarters. The use of teams provides NTI many benefits, especially in support of the time thrust.

The use of teams is a program which supports NTI's Manufacturing Round Table concept. The manufacturing round table consists of strategy, programs, and performance measurement. The round table concept seeks to align programs and performance measures with the operating strategy. The use of multifunctional teams is one of NTI's programs in support of time-based strategy.

NTI stresses time schedule adherence, although not at the sake of other NTI thrusts such as quality. Roy Merrills, president of NTI, explains in his article How Northern Telecom Competes on Time. "Supervisors and manufacturing line operators are trained in quality control and are empowered to shut down the line when they see a problem. When this happens all work stops until the quality issue is resolved."

NTI does track cycle times. This element is essential for performance measurements in a time-based environment.

NTI also raised their standards significantly upon start of their time-based

strategy. NTI set ambitious, but realistic goals. Roy Merrills stated in his article that NTI sought to "double throughput velocity without raising overhead expense or inventory levels, while substantially increasing customer satisfaction." NTI also set goal times of 12 months for product enhancements and 9 months for application features from the time a customer specified a product to the time the product is installed. NTI also wanted to cut the manufacturing cycle time from months to no more than two weeks and, in one case, to less than eight hours. NTI has realized some of these goals and has made good progress on the others.

NTI emphasizes communications within their company as part of their time thrust. NTI does this through the use of teams and also through use of their T-net. Mr. Badelt says that thus electronic data transfer net is designed for formal communications within the company. T-net is an element of NTI's CIM structure. It is used to transfer design data to the factory floor where computer controlled equipment uses the information in the manufacture of products. T-net is also essential for the transfer of documentation materials within the company. Mr. Badelt explains

that CIM is a crucial part of NTI's time thrust. NTI is moving towards integrating CIM in all aspects of their business. The goal is to eliminate human intervention and have just one point of entry within the CIM structure for control.

The time thrust elements of altering company infrastructure, such as capital budgeting criteria and incentive structures are explained thoroughly in Roy Merrills article How Northern Telecom Competes on Time. Mr. Badelt says that these elements are basically unchanged from the description given by Roy Merrills. This is also true for the time thrust elements of education and training. NTI's involvement with these four elements are also described in Chapter III of this thesis.

Mr. Badelt believes that his company is becoming more speedy in it's company culture. NTI has become much more responsive to it's customers needs as measured by yearly customer satisfaction surveys. Mr. Badelt states that NTI can see a direct linkage between their customer satisfaction and their time-based operating strategy. Areas in which NTI worked the time thrust the hardest showed the greatest improvement in customer satisfaction.

IT Support

Mr. Badelt says that IT is absolutely critical to NTI's time thrust. A demonstration was given by NTI to its own people to highlight the strategic importance of data transfer to time-based strategy. NTI received a request for change for a product NTI has which interfaces with an apple computer (printed circuit board). This request was processed through marketing and through the engineering laboratory. The documentation for the product was changed. The new product information was then sent to the factory floor 4000 miles away. The new printed circuit board was then produced and sent to the point where the request originated. The entire process was completed in less than seven days. Mr. Badelt said that this demonstration succinctly pointed out that, how you manage information, is strategic.

However, he cautions that throwing technology at problems will not work unless companies analyze their business processes first. Businesses need to eliminate non value-added processes. If a process cannot be eliminated then companies should try to simplify the process. The last option is for companies to automate processes. This three step process is not just for a site but

also for processes involving multiple sites. NTI underwent a major restructuring of their company in the last year. Mr. Badelt said that one major reason for the restructure was to align corporate resources and structure to support the time thrust. The restructure enabled NTI to get people closer together that required interface. This will allow NTI to save time in business processes and reduce costs as well.

Mr. Badelt gives some IT applications which NTI uses in support of the time thrust. These applications are discussed within the framework of the value chain model.

Inbound logistics. NTI uses some JIT concepts. Supplier relationships are strategically important to NTI. This relationship is extremely beneficial to both NTI and NTI's suppliers. NTI is reducing the number of suppliers and building strong relationships with the suppliers it keeps. NTI wants suppliers to be responsive and to provide quality parts and components. EDI bridges the gap between NTI's inbound logistics database and the suppliers. Mr. Badelt says that EDI reduces significantly the time required for information flow between NTI and suppliers. EDI also provides

tremendous cost savings for both NTI and the suppliers.

Operations. Some of the core IT elements which support this activity are the Product Administration System (PAS), the Integrated Engineering Database (IEDB), and the T-net. PAS is linked to IEDB through the T-net. All product information, including new products, is stored in the IEDB. Factories have this information available to them by using the PAS system to pull information out of the database. These systems are now being tied to the materials systems allowing remarkably reduced human interface in this business process. The goal is to run these factories on less and less paper, while providing necessary information right on the factory floor. Mr. Badelt states that the benefits of this system is not just felt within the factory but also throughout the company. This information is available to anyone in the company which requires it through the use of T-net.

NTI has a factory in Santa Clara which has developed a database and information system to eliminate paper Engineering Change Notices (ECN). This system will eliminate all paper ECNs by the end of this year. NTI is realizing tremendous time and

cost savings from this system and NTI expects more of the same upon full implementation of the system.

Outbound logistics. NTI has a new on-line order entry and processing system. Brian Murphy, a Public Relations Manager of NTI, says this system is operated by NTI's distributors. NTI's distributors can easily make orders through personal computers located in their field locations. This system is tied into NTI's manufacturing processes. NTI can now deliver, made to order PBX's, to their distributors in just five days. This system also gives NTI's distributors a tool for showing customers various PBX configurations and their costs. This makes the distributors task of getting customers bids for NTI's PBX's much easier than before.

NTI has just started to deliver PBX software and PBX software updates electronically. Mr. Murphy states that this IT application reduces delivery times for software as well as delivery costs.

One IT application which is aimed at supporting NTI's customers is the documentation system for the PBX's is now provided on compact disks. This is much cheaper for NTI than paper documentation and it also provides an indexing

feature for their customers. The indexing feature aids customers in retrieving documentation in a fast and effective manner.

Marketing & sales. Mr. Badelt says quotation processes are automated. Some of NTI's companies include customer engineering or applications engineering within the quotation process system. These systems has reduced the time necessary to complete these processes from 26 weeks down to just 4 or 5 weeks for large systems. Order entry processes are also tied to the billing system, reducing the interface time required between these activities.

Service. Mr. Badelt says that their Morrisville plant has a single integrated IT-based network which handles service requests for NTI. The entire service process uses very little paper. This system speeds up service greatly.

Mr. Murphy says NTI now provides computer based training for their customers. Although this system is supported by instructors as required, NTI computer based training has been well received by their customers. This allows training to occur at

the customers pace and convenience. It also cuts down on NTI's training costs.

Infrastructure. NTI has an electronic mail system called COCOS which Mr. Badelt says is used all the time. Fax is crucial for the transfer of information not suitable for COCOS. Voice mail also aids in communications both within and outside of the company. Mr. Badelt believes these IT applications are crucial to their time thrust. Equally important to NTI is their worldwide telecommunications network. Mr. Badelt says that through the use of digital communications and fiber optic networks, clear and instantaneous communications anywhere NTI performs business is possible. A phone call to Tokyo, Japan is just as clear as a call to the plant next door. This company-wide network, with its clear and instantaneous communications, is extremely vital to NTI's time thrust.

Human resource management. Mr. Badelt believes that this is a very important element of NTI's time thrust. NTI has a bulletin board available for individuals within NTI to call up from their terminals. This bulletin board lists all

available job openings for anywhere within NTI. This system aids the human resource management function greatly and provides potential matches between employees and job positions very quickly.

Technology development. NTI uses a lot of CAD. NTI is also using a lot of design simulation. NTI is looking to use more and more design simulation, especially in the areas of printed circuit boards and other hardware. NTI is also getting into Computer Aided Software Engineering (CASE) to shorten software development times. Mr. Badelt states that these IT applications are very important to NTI's time thrust.

Procurement. This activity was covered in the inbound logistics activity.

Summary of Findings

Table 5.1 and Table 5.2 provide a summary of the case studies presented in this chapter. Table 5.1 contains the summary of time-based strategy and initiatives findings. Table 5.2 contains the summary of IT findings related to time-based strategy. This table lists initiatives, programs, and/or systems used to support the time thrust which

rely upon IT. Initiatives which are closely related are categorized together.

To be brief, a yes/no or min/med/max format is used to display the results. Other abbreviations included in the table are: Off for offensively, Def for defensively, Mix for mixture of Off and Def, and Lon for long term.

Table 5.1

SUMMARY OF TIME-BASED STRATEGY
AND INITIATIVES FINDINGS

A Hewlett-Packard, Loveland
B Storage Technology Corporation
C Martin Marietta Aerospace
D Hewlett-Packard, Ft. Collins
E Navistar International
F Northern Telecom Inc.

	A	**B**	**C**	**D**	**E**	**F**
Time-Based Strategy						
Time Thrust	Yes	Yes	Yes	Yes	Yes	Yes
Include in Model	Yes	Yes	Yes	Yes	Yes	Yes
Comparable Thrust	Yes	Yes	Yes	Yes	Yes	Yes
Use Time Thrust	Yes	Yes	Yes	Yes	Yes	Yes
Length of Time Thrust Use	1yr	2yr	4yr	10yr	3yr	5yr
Use of Thrust	Mix	Mix	Off	Mix	Mix	Mix
Competitive Advantage	Yes	Yes	Yes	Yes	Yes	Yes
Advantage Length	Lon	Lon	Lon	Lon	Lon	Lon
Thrust Involvement	Maj	Maj	Med	Med	Maj	Maj
Time Thrust With Other Thrusts	Yes	Yes	Yes	Yes	Yes	Yes
Time-based Initiative						
Redesign Processes	Yes	Yes	Yes	Yes	Yes	Yes
Reduce Admin Delays	Yes	Yes	Yes	Yes	Yes	Yes
Use Teams	Yes	Yes	Yes	Yes	Yes	Yes
Stress Time Schedule Adherence	Yes	Yes	Yes	Yes	Yes	Yes
Track Cycle Times	Yes	Yes	Yes	Yes	Yes	Yes
Raise Standards	Yes	Yes	Yes	Yes	Yes	Yes
Emphasize Communications	Yes	Yes	Yes	Yes	Yes	Yes
Alter Capital Budgeting	No	Yes	Yes	No	No	Yes
Alter Incentive Structures	No	No	No	Yes	No	Yes
Time strategy Education	No	Yes	Yes	Yes	Yes	Yes
Time strategy Training	Yes	Yes	Yes	Yes	Yes	Yes
Speedy Company Culture	Yes	Yes	Yes	Yes	Yes	Yes
Other Elements	No	No	No	No	No	No

Table 5.2

SUMMARY OF IT FINDINGS

A Hewlett-Packard, Loveland
B Storage Technology Corporation
C Martin Marietta Aerospace
D Hewlett-Packard, Ft. Collins
E Navistar International
F Northern Telecom Inc.

	A	**B**	**C**	**D**	**E**	**F**
IT & Time Thrust						
IT Important To Time Thrust	Yes	Yes	Yes	Yes	Yes	Yes
IT Applications Used in Support of Time Thrust. Broken Out by Value Activities and by Company.						
Inbound Logistics						
1 JIT	A,	B,	C,	D,		F
2 EDI	A,		C,		E,	F
3 Bar Coding					E,	
4 MRP II		B,	C			
Operations						
5 CAM/CIM		B,	C,	D,		F
6 Job Scheduling			C,	D		
7 Configuration/Specification			C,	D,		F
8 Automated Facility					E	
9 KanBan/In Progress Inventory	A,		C			
Outbound Logistics						
10 Status Reporting	A,		C,			
11 Automated Warehouses				D		
12 Distributor Links				D,	E,	F
13 Product/Customer Matching with Route Analysis						E
14 Electronic Software Delivery						F
Marketing & Sales						
15 Marketing DBMS	A,		C,	D,	E	
16 Laptops				D		
17 Order Processing	A,				E,	F
18 Sales Forecasting	A					
19 Cellular Telephones				D		
20 Specification/Configuration/Quotation System				D,	E,	F

Table 5.2 (continued).

Service	
21 Job Reporting/Service Analysis	C, D, E
22 CD Documentation System	F
23 IT Network/IS System	F
24 Computer-based Training	F
Infrastructure	
25 Electronic Mail	A, B, C, D, E, F
26 Voice Mail	A, B, C, D, E, F
27 Teleconferencing	C, D,
28 VAN's/Digital Networks	D, E, F
29 Planning/Scheduling systems	C
30 FAX	F
Technology Development	
31 CAD	A, B, C, D, E, F
32 CASE	B, F
33 Database Sharing Network	D
34 Design Simulation	F
Human Resource Management	
35 Career Resource Center/Bulletin Board	A, F
Procurement	
36 On-line Procurement	C, D, F

CHAPTER VI

DISCUSSION OF FINDINGS

This chapter provides an interpretation of the findings for the six case studies.

Time-based Strategy

All six of the interviewees believe time-based strategy is a strategic thrust. All of the interviewees also believe that the time thrust is significant and that it definitely belongs in Frenzel's model. This is significant because five years ago, when Charles Wiseman developed strategic thrust theory, Wiseman believed the five thrusts of cost, differentiation, innovation, growth, and alliance accounted for most of the major moves a firm may make in search of competitive advantage. This finding presents strong evidence that the time thrust merits inclusion to the model.

The definitional requirements to be considered a strategic thrust were also met. The company's time thrusts exhibited strategic polarities, occurred in combination with other

strategic thrusts, and existed in varying degrees of ordering relations.

The strategic polarity characteristic was the most striking finding related to definitional requirements. Five of the six companies described their time thrust strategic polarity as a mixture of both offensive and defensive thrusts. The time thrust helped them to gain advantage in some markets and product lines while it helped to lesson competitors advantages in other markets and product lines.

Perhaps the most significant finding related to time-based strategy is all six companies believe the time thrust has given them competitive advantage. This is impressive when you consider that five of the six companies have been actively pursuing the time thrust for only five years or less. Also, two of the companies consider their time thrust to be medium in strength and yet they have still have gained competitive advantage from its use. This finding suggests that the pervasive nature of the time thrust can provide substantial improvements in company performance in short periods of time. While there are many variables of company performance which were not addressed in this

research which may affect company performance, this finding appears to support this hypothesis.

There is also some evidence the time thrust is different from the other five thrusts included within Frenzel's model. While all six companies believed the time thrust is a viable strategic thrust in itself, they all also believe the time thrust has a special characteristic. All six companies mentioned the time thrust either supports other thrusts or is tightly linked to other thrusts. This is not the case for the other thrusts included within the model. Four of the companies stated that time and cost are tightly linked and that the time thrust supports the cost thrust very well. Performing business processes in less time invariably means less costs. Three of six companies also mentioned that the time thrust supports the innovation and differentiation thrusts. One company also mentioned the time thrust supports the growth thrust.

Because the time thrust may be used to gain competitive advantage both singly and also when used in support of other strategic thrusts, the time thrust is an extremely attractive thrust to pursue.

The difference between the time thrust and the other five thrusts suggests there may be a better way of representing the time thrust within Frenzel's model of strategic influences. Perhaps, a better way of depicting the relationships is to have the time thrust at the base of the other thrusts. This would represent the supportive nature of the time thrust.

Time-based Initiatives

I identified eleven elements or ingredients of time-based strategy from review of literature which appeared were fundamental to the strategy. This research found ten of these elements were used by all six firms. One of the elements, alter infrastructure, was used by only three companies. Altered incentive structures and altered capital budgeting criteria were employed by only two and three companies respectively. One possible interpretation of this finding is that this element is not as important to the strategy as the other elements. The companies which did not use these elements of the time thrust still received competitive advantage from their time thrust. However, several of the companies believed that

these elements were not necessarily unimportant just because they were not used by them. One company thought that they could a better job of matching capital budgeting criteria to support corporate objectives and thrusts. One company did alter their corporate infrastructure in support of their time thrust. This company realigned corporate structure and resources to support the time thrust. This company had been using the time thrust for 5 years, a time greater than all of the other companies except one. This finding suggests that as the time thrust progresses in time, more fundamental changes to company infrastructure are necessary to make continuing progress in the time thrust. Since this occurred in just one company, the support for this proposition is slim.

The other significant finding was none of the six companies identified any other time-based strategy elements important to their company's time thrust. This finding leads me to conclude that the list of elements included within this research is a complete list. While this list of elements is complete for time-based manufacturers, it may not be complete for time-based service organizations. Time-based service organizations were not included

in this study. It is possible that the strategy elements for time-based service organizations may vary slightly from this list of elements.

Of all the time thrust elements, the redesign business processes, reduce administrative delays and controls, multifunctional teams, and ephasize communications elements were given the most attention and significance by the six companies. These four elements are the elements which actually produce the time savings. The other elements are very important to the time thrust from an operational perspective and also for implementation purposes. Education and training makes implementation of time-based strategy easier. Schedule adherence, cycle time tracking, standards and goals, and altered infrastructure elements to support time-based strategy are all essential to make time-based strategy work operationally.

All six companies think the redesign of business processes is essential to the time thrust. A major theme of this element is to eliminate processes which do not add value, simplify required processes, and then automate required processes when and where it is possible. Three of the companies

follow this theme. This finding suggests that this element of time-based strategy is critical.

All six companies put decision making responsibility and authority down at the level where processes occur. This is crucial for reducing administrative delays within the companies.

The use of multifunctional teams is very important to all six companies. The reasons given for use of teams included breaking down functional barriers and reducing administrative delays (five of the six companies). Another reason given for team use is to provide integrated solutions to business problems (two of the six companies). The use of these teams provides these companies integrated solutions to business problems, allows work to be performed simultaneously, and breaks down functional boundaries. The breaking down of functional boundaries is preferred since work in time-based companies is often performed around particular products or services and not in functional departments. These findings suggest that the use of multifunctional teams prevents suboptimization of goals caused by functional goals and objectives. These findings also suggest that time savings resulting from use of these teams, comes from

performing work in parallel, not sequentially, through different functional activities. The findings also suggest the use of these teams may help prevent costly mistakes from occurring. Since members from all functional areas are usually represented from start to finish in a project, mistakes can be avoided early in the project. Interestingly enough, three of the companies stated there were difficulties associated with the use of these teams. Managers were often reluctant to give up responsibility and authority to team members and team members were often reluctant to accept responsibility and authority. This finding suggests that this element of the time thrust fundamentally changes the traditional work environment and people are resisting this change. A transitional period is likely required for the full benefits of this element to be realized.

All of the companies stressed internal communications. Three of the companies stated multifunctional teams is one means of supporting this element. Three of the companies believed their internal IT applications of voice mail, electronic mail, and telecommunication networks support this element particularly well. Other initiatives in

support of this element include training in interpersonal communications skills (three companies) and company policies such as open door policies and first name basis relationships (one company). One interpretation of this data suggests that all of these actions speed the flow of information throughout the company.

All of the companies tracked cycle times. This finding illustrates that this element is an essential performance measurement in a time-based environment.

All of the companies believe high standards are required in support of the time thrust. Several companies pointed out that high, but attainable standards are necessary. Benchmarking was common with a couple of companies venturing out beyond their own industries to examine other manufacturing and design processes. These findings suggest that setting high standards is essential to time-based competitors.

All six companies stressed time schedule adherence. This element was described by the companies as being an essential performance measurement of time-based strategy. This element was identified as essential for meeting windows of

opportunity for product introduction (three companies). Two of the companies stated that this element was important, but not at the sake of other thrusts. These findings suggest that this element is a critical performance measure.

Education in time-based strategy and training in time-based initiatives was accomplished by all six companies. This illustrates the significance placed upon time-based strategy by these companies. It also suggests that this education and training is essential because time-based competition is different from other operating strategies.

Company culture was seen by all six companies as slowly evolving. All of the companies say that they are becoming more responsive to markets and their customers. All of the companies were also quick to point out that this was a very slow progression.

There is strong support for the look at all functions element of the time thrust. Five of the six companies have time thrust initiatives and IT applications which support the time thrust in at least seven of the nine value activities. This finding illustrates these company's desire to

address all facets of their business so that they may gain full benefits and advantages from their use of the time thrust. One company has time thrust initiatives and IT support for them in just four of the nine value activities. One explanation for this lack of use throughout their business is the fact that this company has been using this strategy for less than two years. This company expects their time thrust initiatives and their IT applications to support the time thrust to expand as they progress in their use of the time thrust.

IT and the Time Thrust

All six of the companies stated that IT is extremely critical and essential to time-based strategy. One company stated that their company could not execute their time thrust without IT. Another company stated that IT plays a leading role in their time thrust. Still another company stated that how you manage information is strategically important to their time thrust. These findings demonstrate clearly that information technology is crucial to time-based strategy. However, two of the companies cautioned that business processes must be

good processes before IT can support the time thrust most effectively.

Table 5.2 on pages 142 and 143 identifies 36 IT applications and systems which support the time thrust. These applications span the entire value chain, demonstrating the pervasiveness of IT support for the time thrust. Fourteen of these applications were common to three or more of the companies. All of these applications/systems were identified as providing substantial support for the time thrust. Some of the more common IT applications will now be discussed.

JIT supplier links and EDI between suppliers and time-based competitors are the most significant systems in the inbound logistics activity. These systems speed up the flow of information and materials between these two entities.

In the operations activity, CAM/CIM was the key IT application in support of the time thrust. CAD design information and its transfer to the CAM/CIM equipment was presented as crucial to the overall time thrust in those companies using these systems. Configuration and specification systems were mentioned as providing significant support for the time thrust.

IT links to distributors was the most common IT application in the outbound logistics activity. The primary advantage these systems provide are a faster flow of information between time-based competitors and their distributors.

The marketing and sales activity had three major IT applications used in support of the time thrust. Marketing database management systems were identifies as providing significant time advantages in the management and processing of marketing information. The order processing systems and specification/configuration/quotation systems available to marketing and sales personnel also provided tremendous time savings in this activity. These systems are tied directly into manufacturing systems. This integrated approach to performing business processes through IT systems gives marketing and sales personnel a great tool for obtaining additional sales and for providing their customers products in a very short period of time.

Job reporting and service analysis systems provide support for the time thrust in the service activity. These systems were found in three of the companies.

The infrastructure activity had six IT applications which supported the time thrust. Three of them were used by three or more companies. Voice mail and electronic mail were used by all six companies. They were enthusiastically endorsed by all six companies. Three of the companies mentioned their digital networks/VAN's as being critical to the flow of information throughout their company's widely distributed operations. Teleconferencing systems also deserve mention, as they provide two of the companies with tremendous benefits. These two companies have many sites within their company and teleconferencing provides them with both time and cost advantages.

CAD was by far the most important IT application within the technology development activity. All six companies use CAD and report tremendous time savings from its use. Two of the companies are looking at CASE to shorten software development times. Since time-based competitors rely upon IT for execution of their time-based strategy, the use of CASE may be a result of increased need for software development in these companies. Reducing software development times may be a major factor in producing these systems in

support of the time thrust. Many of the companies interviewed were just now implementing or designing systems to support time-based strategy. While support for this inference is slim, it is a definite possibility.

Two of the companies identified career resource center/bulletin board systems which support their time thrust in the human resource management activity. These systems are easily accessible to anyone within these two companies through personal computers. These companies say that these systems greatly increase the speed of information flow of open job positions and other related information.

Three companies identified on-line procurement systems which provides significant time advantages over older on-line systems or manual systems.

Additional Observations

The most striking observation that can be made from this research, is all of the companies have gained competitive advantage through the use of the time thrust and that IT is considered critical to the execution of the time thrust. What makes this observation even more striking, is the fact that these companies have been pursuing the time

thrust for a relatively short period of time, most of them for 5 years or less. This observation dramatically illustrates the impact IT may have on firm's competitive stature when used in support of time thrust. Because the time thrust also supports other thrusts, companies wishing to make noticeable improvements in their companies competitive posture, should contemplate using the time thrust.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Summary

This research provides an accepted means of portraying time-based strategy. Managers of time-based companies were briefed on strategic thrust theory and interviewed to see if they believe time-based strategy is a valid strategic thrust. These managers did believe time-based strategy is a valid strategic thrust. These managers also believe that the time thrust should definitely be included in Frenzel's model of strategic influences, as their time thrust is as important to them as other thrusts already included in the model.

This research also provided strong evidence that the elements of time-based strategy, identified through literature review, were all essential to time-based strategy. Four strategy elements were identified as especially important to the time thrust. These elements provided the time benefits. They are the redesign of business processes, the use

of multifunctional teams, the reduction of administrative delays and controls, and emphasis on communications. The other elements of time-based strategy were equally important. However their importance comes from facilitating time-based strategy operationally and for easing implementation problems. The other significant finding was that this list of strategy elements was found to be complete by all of the companies. None of the companies identified any other strategy elements which they used in support of the time thrust.

This research also provided strong evidence that IT is absolutely critical to time-based strategy. IT plays a leading role in support of the time thrust and is essential for execution of the time thrust. This research also provides a list of 36 IT applications and systems which these six time-based competitors use in support of their time thrust. This list of IT applications is broken out by specific business value activities. This is especially important, for there is no information available in current literature on how IT can support time-based strategy.

This research is important for several reasons. Direct linkages may be seen between time-

based strategy use, information technology support, and the competitive advantages achieved by these companies. All of these companies have gained competitive advantage through their use of the time thrust. Furthermore, all of these companies described IT support of the strategy as being crucial and essential for execution of the time thrust. These findings provide compelling reasons for continued research in time-based strategy and IT support of time-based strategy. This research also provides managers an essentially complete list of time thrust elements which makes up the time thrust. This research also identified to managers a list of IT applications and systems which may be used in support of the time thrust. I believe these findings will provide managers, in companies who are contemplating use of the time thrust or who are currently implementing the time thrust, practical and useful information which they can use in support of their time thrust.

Future Research Directions

The time thrust was found to be slightly different from the other thrusts included in Frenzel's model of strategic influences. The time

thrust is differentiated from the other thrusts by its ability to reinforce or support other strategic thrusts. Future research into this characteristic of the time thrust should provide additional insights into the time thrust. It would also be interesting and meaningful to modify Frenzel's model to accommodate the time thrust's unique quality.

The redesign of business processes is a significant time thrust element. Additional research of how IT may support this initiative should prove to be very fruitful. Process design, process modeling, and process simulation were all mentioned in this research. However, these tools are not yet common among these companies. Because this element of the time thrust is so important, it is reasonable to expect these type tools will play an increasingly vital role in time-based companies.

Research in the implementation of multifunctional teams is another source of research which would be useful for time-based competitors. Many of these companies identified problems associated with this element of time-based strategy. Identifying means to assist companies to help their workers and managers cope in this new working

environment would prove to be very beneficial for time-based companies.

Additional research relating IT applications and systems to specific time thrust elements would also provide additional benefits. Now that specific IT applications and systems have been identified which support the time thrust, an in-depth study into any of these systems or applications would provide much needed and detailed information of the relationships between specific IT applications and time-based strategy elements. This specific information would be invaluable to managers by providing them with specific applications which support specific time thrust elements.

The final direction future research may take is to replicate and expand upon the findings of this research. The companies in this research have used this strategy for just a very short time. It would be very educational to repeat this research with the same companies in a couple of years. As this strategy matures in these companies, it would be useful to document changes or the lack of changes to the time thrust. Future research might also expand to include time-based service companies. It would be useful to compare and contrast differences in the

time thrust between these different types of companies. It would also expand our knowledge of time-based competition to include other types of companies.

In summary, any research relating IT and time-based strategy will be useful to companies looking at time-based competition. As mentioned in the opening chapter, time-based competition is on many major companies priority lists. Any gains in our knowledge of this time thrust will be useful to these companies as they seek competitive advantages in their markets.

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APPENDIX A

LEADING INFORMATION SYSTEMS USED FOR COMPETITIVE ADVANTAGE

Leading Information Systems Used
For Competitive Advantange

Company	Application	User
American Airlines	"Sabre" Reservation System	Travel Agency
American Hospital Supply	"ASAP" Purchasing Order Entry	Hospital Purchasing Department
Banc One Corporation	Automatic Teller Machines	Customer Affiliate Banks
Citicorp	Automatic Teller Machines	Customer Affiliate Banks
Dun & Bradstreet	"DunsNet" Financial Reports	Customer
Federal Express	"Cosmos" Package & Letter Tracking	Field Offices
Mckesson Corporation	"Economost" Order Processing	Drugstores & Hospitals
Merrill Lynch & Company	Cash Management Account	Field Offices
United Airlines	"Apollo" Reservation System	Travel Agency
USAA Insurance	Automated Insurance Environment	Field Offices

Source: James C. Brancheau and Justus D. Naumann, "A Manager's Guide to Integrated Services Digital Network," Database (Spring 1987): 28.

APPENDIX B

INTERVIEW MATERIALS

RESEARCH PROJECT

TIME-BASED COMPETITION FOR COMPETITIVE ADVANTAGE: AN INFORMATION TECHNOLOGY PERSPECTIVE

EXECUTIVE SUMMARY

Overview

Examines time-based competition and ascertains how and where Information Technology is used in support of the Time-based strategy.

Objective

This study seeks to identify IT uses which are effective in this type of competitive strategy and to determine where in the business processes IT is used in support of this strategy. Insight is sought which is needed by managers who are currently operating under this strategy or are expecting to transform their companies into time-based competitors. This study also seeks to place time-based strategy in context with current works in competitive strategy.

Research Participants

A number of firms, including manufacturers, service providers, or distributors, which are currently using time-based strategy are to be included in the research sample.

Data Collection

Data are collected via semi-structured interviews, either by telephone or by personal interviews.

Participant Time Requirement

Interviewees are asked to give approximately one hour of time for the interview.

Confidentiality

All interview information given by the firm's employees is held in strictest confidence. Details will not be disclosed outside of the research committee unless expressly permitted. If desired, anonymity may be requested. The questions are not personal in nature and do not cover sensitive material. Participation is voluntary and participants may refuse to answer any questions for any reason. You may withdraw from the study at any time.

Participant Benefits

Firms participating in the study will receive a copy of the study's results and conclusions if desired. Participants, through the research results, should gain added insight not possible through conventional means. Participation in the study is deeply appreciated.

Graduate School of Business Administration
University of Colorado - Boulder 80309-0419
Director: Dr. Carroll Frenzel
Researcher: Jerry Hanlin

INTERVIEW GUIDE

I. Time-Based Strategy

Refer to the brief on strategic thrusts theory to answer the following questions. For this set of questions, the Time thrust is described as competitive advantage that is secured by rapid response to changing market conditions or by supplying a more timely flow of products or services.

* Do you believe time-based strategy is a strategic thrust? If not, why?
* Do you believe that the time thrust merits inclusion to the model of strategic thrusts as being a major move a company may use to seek advantage? If not, why?
* Do you believe the time thrust is comparable in stature to the thrusts of cost, differentiation, innovation, growth, and alliance? If not, why?
* Does your company use the time thrust?
* Is your companies use of the time thrust offensive to gain competitive advantage or is it defensive to lesson competitors advantage?
* Has the use of the time thrust given your company competitive advantage? If so, do you think the advantage is short-term or long-term?
* Do you consider your company's use of the time thrust to be major, medium, or minor?
* Is the time thrust used in conjunction with other thrusts? If so, what are they?
* Why does your company use the time thrust?

II. Time-Based Initiative

* How long has your company been using the time thrust?
* Did your company speed up existing processes or did they redesign business processes with cycle times in mind?
* Is your company actively pursuing to reduce administrative and bureaucracy delays caused by administrative controls and excessive number of approvals required to perform an activity?
* Is daily work performed in a traditional departmental form or is it performed by multi-functional teams?
* If teams are used to perform work, are they organized around products and/or services?
* Does your company strictly adhere to time schedules?
* Does your company track cycle times and other measures of progress in a time-based environment?
* Were performance standards raised significantly when your company switched to a time-based strategy?
* Does your company emphasize better inter-personal communications? If so, how?
* Did your company alter capital budgeting criteria to ensure time-based strategy is considered?
* Did your company alter the personnel incentives policies and practices to support time-based strategy?

* Were people educated on time-based strategy and trained to work in a time-based environment?
* Do you think your company culture has speed in it or is it evolving towards having speed in it?
* Beside the elements of time-based strategy listed above, are there any other means which your company supports time-based strategy? If so, how?
* For each of the elements of time-based strategy which your company uses, please rate it's importance towards contributing to time-based strategy?

III. Information Technology Relevance

Refer to the value chain concepts and the figure of a typical business value chain to answer the following questions.

For each particular IT system which supports time-based strategy, answer the following questions:

* What is the name of the system?
* What is the system's function?
* Which value activities does this system support?
* How does this system support the time-based strategy in each of the value activities affected?
* Which linkages between value activities are most important to this system?
* How effective is this system in support of the overall time-based strategy of each of the value activities affected?

Which value activities are most important in your company?

How did time-based strategy spread throughout your company's value chain?

Is overall IT support of the time thrust effective? Essential?

III. Background Information

The following personal information is required for analysis.

How many years of management experience?

How many years of Information Technology experience?

Thank you very much for your time.

Strategic Thrusts Brief

The theory of strategic thrusts is a current theory of competitive actions which, when undertaken, may result in competitive advantage. This theory has gained acceptance within the arena of competitive strategy. Prior to discussion of the Strategic Thrusts Model and it's relevance to time-based strategy, strategic thrusts and strategic targets must first be explained.

This model shows the interplay of *strategic thrusts* and *strategic targets*. Strategic thrusts are defined as major moves available to organizations in search of advantage. By supporting or shaping the organization's strategic thrusts, Strategic Information systems support or shape its competitive strategy. Strategic thrusts therefore constitute the critical interface linking competitive strategy and information systems. Strategic targets are the targets at which strategic thrusts may be aimed. The matrix of strategic targets and strategic thrusts provides users of this model a systematic means of identifying strategic information systems opportunities.

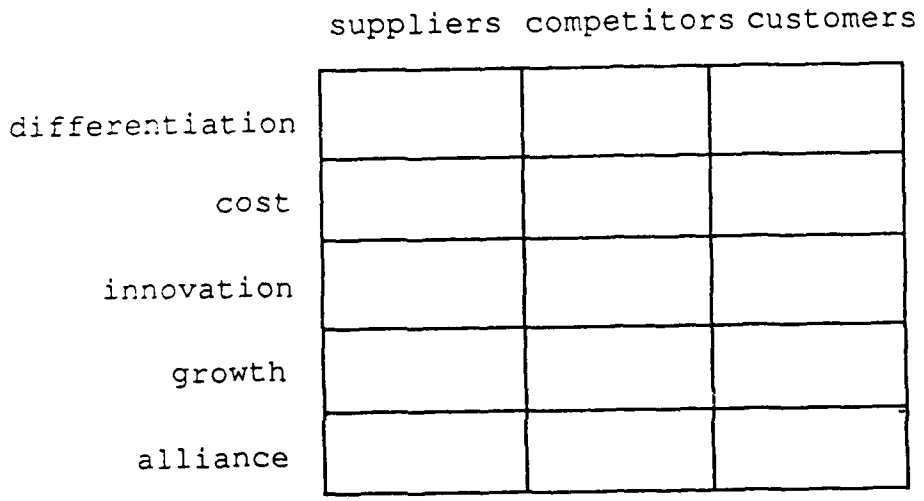
Thrust Definitions

Cost Thrust -- Strategic moves intended to reduce or avoid costs the firm would otherwise incur, to help suppliers or customers reduce or avoid costs so that the firm receives preferential treatment or other benefits it deems worthwhile, or to increase the costs of its competitors.
Differentiation Thrust -- Strategic moves intended to differentiate a firm's service or product offerings from their competitors.
Innovation Thrust -- Strategic moves intended to increase the firm's competitive advantage or reduce the advantage(s) of its strategic targets through the use of product or process innovations.
Growth Thrusts -- Strategic moves which provides for product offerings growth and/or functional growth, such as forward or backward integration and spin-offs.
Alliance Thrusts -- Intrafirm or interfirm combinations designed to support or shape the competitive strategy of one or more of the allies.

Thrust Characteristics

1. Thrusts manifest strategic polarities. They are capable of assuming opposing sets of attributes, depending upon their strategic use. For example, a cost thrust may be used offensively to gain competitive advantage or it may be used defensively to lesson the advantage of its competitors.
2. Thrusts frequently occur in combination.
3. Thrusts are subject to ordering or degree relations. For example, a cost reduction may be major, medium, or minor.
4. Thrusts are related by dialectical processes. For example, efforts in cost thrusts will be switched to another thrust when further efforts would be more advantageous in another thrust rather than remaining with the cost thrust.

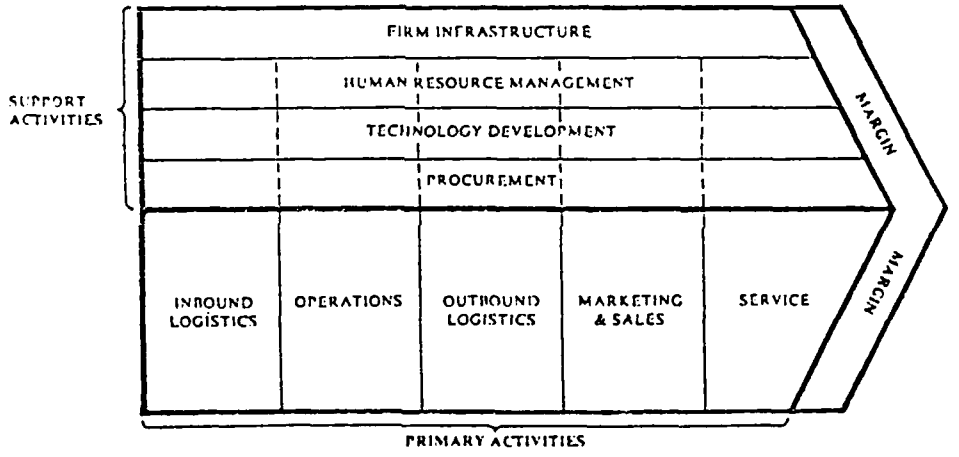
Strategic Thrusts Model



Value Chain Brief

The value chain model conceptually divides a company's activities into technologically and economically distinct activities it performs to do business. Support activities provides inputs and the infrastructure that allows the primary activities to take place. The value chain is a system of interdependent activities which are connected by linkages. Linkages exist when the way in which one activity is performed affects the cost or effectiveness of other activities. Linkages require activities to be coordinated. Linkages often create trade-offs in performing different activities that should be optimized. Optimization of linkages, in accordance with the company's strategy, should lead to competitive advantage.

The Value Chain



Activity	*Definition*
Inbound logistics	Materials receiving, storing, and distribution to manufacturing premises.
Operations	Transforming inputs into finished products.
Outbound logistics	Storing and distributing products.
Marketing and sales	Promotion and sales force.
Service	Service to maintain or enhance product value.
Corporate Infrastructure	Support of entire value chain, such as general management, planning, finance, accounting, legal services, government affairs, and quality management.
Human resource management	Recruiting, hiring, training, and development.
Technology development	Improving product and manufacturing process.
Procurement	Function or purchasing input.